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January 15, 2015

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Members of the National Drinking Water
Advisory Council (NDWAC)

RE: Comments on the Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council

Dear Mr. Grevatt and Members of the National Drinking Water Advisory Council:

Please accept the following comments on the Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council.

INTRODUCTION

The recent public health crisis in Flint, Michigan is only the latest example of the ongoing danger of lead contamination in the nation's drinking water. The upcoming revisions to the Lead and Copper Rule ("LCR") represent an opportunity for EPA to make essential improvements to the most important regulatory mechanisms for removing lead from the drinking water consumed by millions of people in the United States.

The Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council ("the Report") contains many important suggestions for improvement to the LCR. EPA should take special note of the Report's reassessment of the LCR based on the growing body of scientific knowledge about lead contamination of drinking water as well as documented problems with the LCR's implementation since the rule was first promulgated in 1991. In particular, the Report highlights the importance of replacing *all* known lead service lines ("LSLs") in light of the fact that there is no safe level of lead exposure, and the fact that the risk of contamination is present whenever water makes contact with lead plumbing. The Report's proposals to establish a household action level for lead and to strengthen the LCR's public education provisions would also represent important improvements to the rule.

However, the revised LCR will require significant modifications and additions beyond those proposals put forth in the Report if it is to be sufficiently protective of public health. Provisions for ensuring proactive replacement of all LSLs must be accompanied by robust accountability mechanisms to ensure that public water systems ("PWSs") fulfill their replacement obligations. The household action level and public education proposals will likewise need to be bolstered to ensure their efficacy. Furthermore, if implemented, the Report's proposals regarding customer tap sampling, corrosion control treatment, and LSL inventory would likely *diminish* the efficacy of current LCR provisions in these areas. EPA must reject these regressive proposals in order to avoid backsliding in the LCR.

The Report also omits or gives insufficient attention to some of the most important contributors to lead contamination of drinking water currently unaccounted for in the LCR: physical disturbance of lead-containing pipes and periods of disuse of such pipes when a residence is unoccupied. Both of these can lead to dangerous spikes in lead levels at the tap. Additionally, the Report fails to address one of the greatest obstacles to effective, equitable implementation of the current LCR: its "shared responsibility" approach that holds household residents largely responsible for protecting themselves from lead-contaminated drinking water, regardless of their ability to bear the significant costs of doing so. As discussed in further detail below, the current approach to this shared responsibility regime has contributed to widespread instances of partial LSL replacement, in many cases due to the residents' inability to pay for full LSL replacement—a practice that can actually increase lead levels in drinking water. For this and other reasons, the impact of lead-contaminated water is distributed disproportionately along lines of class, race, and ethnicity. The revised LCR must do more to ensure that lead-free water is available to everyone served by a PWS.

The Report is the culmination of months of hard work by the LCR Working Group, and EPA should pay close attention to the important suggestions to improve the LCR it contains. However, as EPA carries out the LCR long-term revisions process it should be aware that the LCR revisions will need to go well beyond the recommendations in the Report if they are to achieve their public health-protection objectives. The dangers of lead contamination are too great to allow for anything less.

I. Background on Lead

Lead is a dangerous neurotoxin that persists in the environment and bioaccumulates when taken into the human body. Scientific consensus shows that there is no safe level of lead exposure.[1] EPA and the Center for Disease Control ("CDC") have recognized this.[2]

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[1] *See* EPA, Basic Information about Lead in Drinking Water, last updated Mar. 6, 2012, http://water.epa.gov/drink/contaminants/basicinformation/lead.cfm ("[T]he best available science . . . shows there is no safe level of exposure to lead.").

In children, lead exposure is known to cause "[p]ermanent damage to the brain and nervous system, leading to behavior and learning problems, lower IQ, and hearing problems," slowed growth, anemia, and, "[i]n rare cases . . . seizures, coma and even death."[3] Lead is especially dangerous for children because it acts on their developing brains and nerves.[4] Lead exposure has been linked to neurological and behavioral problems, including attention-deficit/hyperactivity disorder, criminal behavior, and a need for special education.[5] There is substantial evidence that lead exposure negatively impacts children's IQ and academic performance.[6] For adults, lead exposure can cause nervous system effects, cardiovascular effects, increased blood pressure, decreased kidney function, and reproductive problems for adults of both sexes.[7] Further, lead can accumulate for decades in a person's bones.[8] Certain circumstances—including pregnancy, breaking a bone, and old age—cause accumulated lead to be released back into the bloodstream and the organs where it can cause damage years after initial exposure.[9]

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[2] *See*, *e.g.*, CDC, What do Parents Need to Know to Protect Their Children (2012), available at http://www.cdc.gov/nceh/lead/ACCLPP/blood_lead_levels.htm ("'The most important step parents, doctors, and others can take is to **prevent lead exposure before it occurs**.'"); CDC, Lead in Drinking Water and Human Blood Lead Levels in the United States (2012), available at http://www.cdc.gov/mmwr/preview/mmwrhtml/su6104a1.htm?s_cid=su6104a1_w ("Because lead accumulates in the body, all sources of lead should be controlled or eliminated to prevent childhood lead poisoning.").

[3] EPA, Learn About Lead, last updated Apr. 1, 2013, http://www2.epa.gov/lead/learn-about-lead.

[4] National Library of Medicine, MedlinePlus: Lead poisoning, last updated Feb. 1, 2013, http://www.nlm.nih.gov/medlineplus/ency/article/002473.htm

[5] CDC, CDC's Healthy Homes/Lead Poisoning Prevention Program, 2 (2012), *available at* http://www.cdc.gov/nceh/information/program_factsheets/lead_program_overview.pdf

[6] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, ix (2012), *available at* http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[7] EPA, Learn About Lead, last updated Apr. 1, 2013, http://www2.epa.gov/lead/learn-about-lead. *See also* California DTSC, Requirements for Low Lead Plumbing Products in California, (2011), *available at* http://www.dtsc.ca.gov/PollutionPrevention/upload/Lead-in-Plumbing-Fact-Sheet.pdf ("For adults, high levels of exposure to lead in drinking water can result in kidney problems, high blood pressure, nerve disorders, fertility problems, muscle and joint pain, irritability, memory and concentration problems.").

[8] ATSDR, Toxicological Profile for Lead, 7–8 (2007), *available at* http://www.atsdr.cdc.gov/toxprofiles/tp13.pdf.

[9] *Id.*

Children in the United States continue to show high levels of lead in their blood.[10] "Childhood blood lead levels in the United States differ across groups in the population, such as those defined by socioeconomic status and race/ethnicity."[11] Blood-lead levels ("BLLs") tend to be higher for children living in older housing, and children who suffer nutritional deficiencies.[12] There are also significant disparities in the way that lead contamination affects different racial and ethnic groups: "About 22% of African American children and 13% of Mexican American children living in pre-1946 housing are lead poisoned, compared with 6% of white children living in comparable types of housing."[13] The National Black Environmental Justice Network notes that "Black children are five times more likely than white children to have lead poisoning [and] 1 in 7 black children living in older housing has elevated blood lead levels."[14] The CDC has noted that, based on data from the 1999-2002 and 2007-2010 National Health and Nutrition Examination Survey, "disparities in the [geometric mean] BLL by factors such as race/ethnicity and income level, which have been important historically, persist."[15]

Additionally, because lead is absorbed into children's bones and accumulates, disparate exposure from others sources compound the dangers of lead for children in certain vulnerable communities.[16] For example, "[c]hildren living in poverty and Black non-Hispanic children tend to have higher blood lead levels and higher levels of lead-contaminated dust in the home than do other children," making them especially vulnerable to additional lead exposure coming from their water.[17] Differences in mean BLLs can be traced to differences in housing quality, which can affect water supplies, environmental conditions, nutrition, and other factors that often result

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[10] *See*, *e.g.*, CDC, Blood Lead Levels in Children Aged 1–5 Years — United States, 1999–2010 (Apr. 5, 2013), *available at* http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6213a3.htm?s_cid=mm6213a3_e ("An estimated 535,000 U.S. children aged 1–5 years had BLLs ≥5 μg/dL.").

[11] EPA, America's Children and the Environment, 119 (3d ed., 2013), *available at* http://www.epa.gov/opeedweb/children/publications/ACE3_2013.pdf. See also, e.g., America's Children and the Environment, chart on page 125.

[12] EPA, America's Children and the Environment, at 119.

[13] NBEJN, Lead Facts in Black and White and Green, 2 (2005), *available at* http://www.nbejn.org/factsheets/LeadNBEJN-05new.pdf.

[14] *Id.*

[15] CDC, Blood Lead Levels in Children Aged 1–5 Years — United States, 1999–2010 (Apr. 5, 2013), *available at* http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6213a3.htm.

[16] *See*, *e.g.*, EPA, Lead in the Air: Health, last updated Mar. 13, 2012, http://www.epa.gov/oaqps001/lead/health.html ("Once taken into the body, lead distributes throughout the body in the blood and is accumulated in the bones.").

[17] EPA, America's Children and the Environment, at 119.

in the existence of notable racial and income disparities in BLLs.[18] Maternal nutrition can also affect the lead exposure of children, both during and after pregnancy.[19]

The CDC has also recognized that even very low BLLs can cause significant harm to children.[20] It has abandoned its prior practice of defining the "blood lead level of concern" as 10 μg/dL or greater, based on a strong body of evidence that BLLs below 10 μg/dL are associated with significant health effects. In particular, at BLLs less than 10 μg/dL children are reported to suffer irreversible "cardiovascular, immunological, and endocrine effects," IQ deficits, attention deficit disorders and decreased academic performance.[21] The CDC has created a new reference value requiring action, 5 μg/dL. The CDC found that "[t]here are approximately 450,000 U.S. children with BLLs above [the CDC's suggested reference value of 5 μg/dL] that should trigger lead education, environmental investigations, and additional medical monitoring."[22]

For many years, drinking water has been, and continues to be, a significant source of lead exposure.[23] A 2010 CDC study "found that children living in houses with lead pipes were three times as likely to have elevated blood lead as children in houses without lead pipes."[24] "Adults absorb 35%-50% of the lead they drink, and the absorption rate for children may be greater than 50%."[25] The Children's Health Protection Advisory Committee has stated that "it

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[18] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, x (2012), available at http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[19] *See* EPA, Learn about Lead, last updated Apr. 1, 2013, http://www2.epa.gov/lead/learn-about-lead ("During pregnancy, lead is released from bones as maternal calcium is used to help form the bones of the fetus. This is particularly true if a woman does not have enough dietary calcium. . . . Lead can also be transmitted through breast milk.").

[20] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, ix (2012), *available at* http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[21] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, ix (2012), *available at*http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[22] *Id.* at x.

[23] *See, e.g.*, WHO, Childhood Lead Poisoning, 44 (2010) ("Lead plumbing . . . has contaminated drinking-water for centuries, and lead in water can contribute to elevated blood lead concentrations in children"); New York City, New York City Plan to Eliminate Childhood Lead Poisoning, 21 (2005) (identifying the protection of "infants and children from exposure to lead in drinking water" as a key strategy to combat childhood lead poisoning).

[24] *See* David Brown, *Study of D.C. water sharpens understanding of lead threat*, Wash. Post, Dec. 11, 2010, available at http://www.washingtonpost.com/wp-dyn/content/article/2010/12/11/AR2010121102871.html?sid=ST2010122005141.

[25] William L. Roper, et al., Preventing Lead Poisoning in Young Children, ch. 3 (1991), http://www.cdc.gov/nceh/lead/publications/books/plpyc/contents.htm.

has been estimated that 10–20% of the total lead exposure in children can be attributed to a waterborne route, through the consumption of contaminated water."[26] "Exposure to lead via drinking water may be particularly high among very young children who consume baby formula prepared with drinking water that is contaminated by leaching lead pipes."[27]

The most significant source of lead in drinking water is plumbing, particularly in cities with old water systems. "Plumbing that contains lead may be found in public drinking water systems, and in houses, apartment buildings, and public buildings that are more than 20 years old," and even newer systems may contain many components with up to 8 percent lead.[28] Lead-containing service lines, which connect residential plumbing to water mains, are an especially significant source of lead. Such LSLs were commonly used until the mid-1950s,[29]although municipalities may have continued installing them up until 1986 when they were banned. In 1991 EPA estimated that there were at that time "about 10 million lead service lines/connections in the United States and that about 20 percent of all public water systems [had] some lead service lines/connections within their distribution system."[30] EPA's current estimates indicate that there are still roughly 10.3 million full or partial LSLs in the United States.[31] Compounding these problems, "[a]ll water is corrosive to metal plumbing materials to some degree."[32]

In Washington, D.C. for instance, approximately 42,000 children may have been exposed to dangerous levels between 2001 and 2004, during which time "[t]he lead concentrations in the city's water were sometimes hundreds of times higher in individual homes than the amount the

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[26] Letter from CHPAC to EPA, at 8 (Feb. 14, 2013), *available at* http://yosemite.epa.gov/ochp/ochpweb.nsf/content/lead_letter_2013.htm/$File/lead_letter_2013.pdf.

[27] EPA, America's Children and the Environment, 118 (3d ed., 2013), *available at* http://www.epa.gov/opeedweb/children/publications/ACE3_2013.pdf.

[28] ATSDR, Toxicological Profile for Lead, *supra* note 8, at 5; EPA, Lead in Drinking Water.

[29] DC Water and Sewer Authority, Understanding Lead and Water website ("In the U.S., lead service pipes were installed until the mid-1950s. Older properties may still have lead service pipes, which connect the water main in the street to household plumbing.") http://www.dcwater.com/lead/default.cfm (last visited Nov. 06, 2015).

[30] *Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper*, 56 Fed. Reg. 26460, 26466 (June 7, 1991) (hereafter "1991 Lead and Copper Rule" or "1991 LCR"). EPA based its estimate on a survey by the American Water Works Association.

[31] U.S. EPA, Lead Service Line Replacement Primer for Nat'l Drinking Water Advisory Comm. Lead and Copper Rule Working Group (Oct. 22, 2014).

[32] EPA, Consumer Factsheet on Lead in Drinking Water, last updated Mar. 6, 2012, http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/fs_consumer.cfm.

federal government consider[ed] a level of concern."[33] Attempts to repair the lead problem in those homes by replacing only a portion of certain individual LSLs has actually made the problem worse.[34] EPA's 2010 analysis showed that in D.C. homes with LSLs, 26.5% percent of children had blood-lead levels of 5.0 μg/dL or higher and 6% had BLL of 10.0 μg/dL or higher.[35]

The District of Columbia is not alone. During the last decade, studies in numerous cities have revealed high levels of lead in school drinking water, including: Seattle, WA;[36] Durham, NC;[37] Philadelphia, PA;[38] Syracuse, NY;[39] Baltimore, MD;[40] Portland, OR;[41] and San Francisco,

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[33] Carol D. Leonnig, *High Lead Levels Found in D.C. Kids*, Wash. Post, Jan. 27, 2009, available at http://articles.washingtonpost.com/2009-01-27/news/36849769_1_blood-lead-harmful-levels-water-crisis.

[34] *Id.*; *see also* Brown, et al., Association between children's blood lead levels, lead service lines, and water disinfection, Washington, DC, 1998–2006, Environ. Res. (2010), doi:10.1016/j.envres.2010.10.003.

[35] Letter from Mary Jean Brown, Chief, Healthy Homes and Lead Poisoning Prevention Branch, CDC to Lead Poisoning Prevention Program Managers, Important update: Washington, D.C. Blood Lead Level Tests (May 20, 2010), http://www.cdc.gov/nceh/lead/blood_levels.htm. In D.C. homes without a lead service line (but where there was still potential lead exposure inside the home's plumbing), 13.4% had blood-lead levels of 5.0 μg/dL or higher and 2% had BLL of 10.0 μg/dL or higher.

[36] Sanjay Bhatt, *Drinking Water to be Tested at All Seattle Schools*, Seattle Times, Dec. 18, 2003, at B1.

[37] Michael Petrocelli, *School's Drinking Fountains Shut Down: 'Actionable' Lead Amounts Turn up at Y.E. Smith Magnet*, Herald-Sun, Aug. 4, 2004, at C1; see also Catherine Clabby, Expert Faults EPA on Lead: Chemical Change Cited in Durham Water Tests, News & Observer, June 30, 2006,

http://www.newsobserver.com/politics/story/456206.html.

[38] *Pennsylvania: Philly Schools Find Unsafe Lead Levels in 20 Percent of Water Outlets*, eSchool News Online, Dec. 1, 2000, http://www.eschoolnews.com/news/showstory.cfm?ArticleID=2003.

[39] Maureen Nolan, Schools to Get Drinking Faucet Filters: The Project is Intended to Reduce the Levels of Lead in City Schools' Drinking Water, Post-Standard, Aug. 17, 2003, at B3; Government Accountability Office (GAO), Drinking Water: EPA Should Strengthen Ongoing Efforts to Ensure that Consumers are Protected from Lead Contamination 50-53 (2006). Syracuse found almost two dozen schools with high lead levels in the drinking water after performing tests at the request of the EPA, which was concerned about high blood-lead levels among the city's children. D'Vera Cohn, EPA Asks for States' Plans on Lead: Widening Water Problem Spurs Action, Wash. Post, ar. 28, 2004, at C01.

[40] Tanika White, Fountains with Lead Remained in Schools: Plan to Use Bottled Water Was Never Carried Out, Despite Contamination, Baltimore Sun, Feb. 7, 2003 , at 1B.

CA.[42] Most recently, Flint, MI saw a spike in lead levels at residents' taps when the city switched its source of drinking water without taking necessary steps to control corrosion of lead pipes in its water system.[43] Testing revealed elevated levels of lead in the blood of Flint children, and some local schools were forced to turn off their water fountains when sampling revealed lead levels in excess of federal standards.[44] The lead contamination crisis in Flint can be traced in part to an apparent failure to follow water treatment procedures mandated by the current LCR. Nonetheless, it underscores the ongoing threat that lead-contaminated water poses to public health twenty-four years after the LCR was first promulgated, and the need for more stringent enforcement of the human health safeguards under the LCR.

II. Regulatory History

The Safe Drinking Water Act ("SDWA"), 42 U.S.C. 300f *et seq.*, requires EPA to set standards for drinking water quality, including maximum levels for contaminants that may have an adverse effect on the health of persons. SDWA applies to every public water system ("PWS") in the United States. A PWS is defined as "a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals."[45]

EPA published the Lead and Copper Rule in 1991 in response to Congress' 1986 amendments to the SDWA.[46] EPA had originally contemplated setting a maximum contaminant level of zero for lead in drinking source water, but in the final 1991 rule EPA agreed with commenters who "argued that setting [a maximum contaminant level] for levels in source water in addition to the treatment technique requirements for corrosion by-products would result in unnecessary confusion among the public and the regulated community."[47] Instead of setting a maximum contaminant level, EPA adopted a final rule "consisting solely of a treatment technique that seeks to remedy all sources of lead and copper contamination caused by both

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[41] Michelle Cole, *Schools Shut Off Drinking Fountains*, Oregonian, Aug. 25, 2001, at A01.

[42] Nanette Asimov, Toxic Lead Found in Schools: Paint, Drinking Water Tested in S.F. District, San Francisco Chronicle, Nov. 14, 2000, at A21.

[43] Monica Davey, Flint Will Return to Using Detroit's Water After Findings of Lead in Local Supply, New York Times, Oct. 9, 2015, at A16.

[44] *Id.*

[45] 42 U.S.C. § 300f (4)(A).

[46] 1991 Lead and Copper Rule, 56 Fed. Reg. at 26460. Before 1991, under an interim rule published by EPA in 1975, the maximum contaminant level for lead was 0.050 milligrams per liter. *Id.* at 26463.

[47] *Id.*, 56 Fed. Reg. at 26472.

corrosion and contaminated source water."[48] EPA also established a maximum contaminant level *goal* of zero, and stated that "[t]he goal of [the] rule is to provide maximum human health protection by reducing the lead and copper levels at consumers' taps to as close to the [maximum contaminant level goal] as is feasible."[49]

The treatment technique requirements include corrosion control treatment, source water treatment, LSL replacement, and public education. The rule requires each PWS to monitor a specified number of sites depending on the size of the system.[50] Treatment techniques are triggered if samples show an exceedance of the "lead action level" under the rule, which is "exceeded if the level of lead in more than 10 percent of the targeted tap samples is greater than 0.015 mg/L (90th percentile)."[51]

Spurred by the aforementioned reports of lead contamination in the District of Columbia's drinking water, EPA conducted a one-year review of the nationwide implementation of the LCR beginning in 2004.[52] The review identified a number of "targeted changes" to improve the LCR's efficacy in the short term as well as several issues to be addressed over longer-term rulemakings.[53] In 2007 EPA promulgated regulations addressing the short-term revisions to the LCR.[54]

EPA has taken the first steps in crafting regulations to address the more substantial, long-term issues identified in the 2005 report, a process known as the LCR long-term revisions.[55] Before EPA publishes regulations for public comment, the SDWA provides that the agency will consult NDWAC, which is composed of representative from utilities, advocacy groups, and the general public appointed by the EPA Administrator.[56] In anticipation of the LCR long-term revisions, EPA requested that NDWAC establish the LCR Working Group, tasked with

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[48] *Id.*

[49] *Id.*, 56 Fed. Reg. at 26478.

[50] 40 C.F.R. § 141.86(d)(2).

[51] *Id.*; 40 C.F.R. § 141.80(c)(1).

[52] *See* Drinking Water Lead Reduction Plan Fact Sheet, *available* at http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/upload/2009_08_11_lcrmr_pdfs_Drinking_Water_Lead_Reduction_Plan.pdf.

[53] *Id.*

[54] 72 Fed. Reg. at 57782.

[55] Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council ("LCR WG Report") 9.

[56] 42 U.S.C. § 300j-1(a).

analyzing the LCR and developing recommendations to improve the regulations.[57] The Working Group released its Report to NDWAC on August 24th, 2015 after over a year of deliberations, with one member dissenting.[58]

III. The Lead and Copper Rule Working Group Report

The Report recognizes the urgent necessity of revising the LCR, highlighting "questions of disparate impact and environmental justice" in lead contamination of drinking water and noting the need to incorporate advances in scientific knowledge since the current LCR was promulgated.[59] To that end, the Report offers five broad recommendations to improve the LCR's approach to removing lead from drinking water: encouraging the removal of all LSLs, modifying tap water monitoring requirements, improving corrosion control treatment ("CCT"), expanding public education ("PE") programs, and establishing a household action level for lead.[60] Making proactive LSL removal the cornerstone of the LCR's lead remediation program is an important step forward from the current LCR, which mandates LSL removal only when a PWS exceeds the lead action level. Because full LSL removal can take years or decades to complete, minimizing public exposure to lead contamination in the interim is essential. Accordingly the Report's remaining recommendations highlight significant shortcomings and gaps in the current LCR's monitoring, education, and water treatment provisions.

Even as the Report acknowledges the severity of the threat that lead-contaminated drinking water poses to public health, its recommendations fall short of what needs to be done to effectuate the purpose of the LCR—i.e., "to provide maximum human health protection by reducing the lead and copper levels at consumers' taps."[61] Merely *encouraging* PWSs to adopt proactive LSL replacement goals does nothing to ensure accelerated LSL removal absent consequences for failing to meet LSL removal targets. The Report's recommendations regarding PE and the household action level should also be strengthened to ensure that they lead to robust action to protect public health. More troublingly, the proposals to modify the LCR's tap monitoring and CCT provisions would likely *reduce* the efficacy of these essential parts of the rule's treatment technique.

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[57] LCR WG Report at 9.

[58] Yanna Lambrinidou, Statement of Dissent from the Report of the Lead and Copper Rule Working Group to the EPA National Drinking Water Advisory Council ("Dissent").

[59] LCR WG Report at 5.

[60] LCR WG Report at 2-3. The Report also includes recommendations to improve the LCR's program for addressing copper contamination, which are not addressed in this comment.

[61] *Id*., 56 Fed. Reg. at 26478.

A. Proactive Replacement of All Lead Service Lines

The Report states, "[r]emoving the sources of lead in drinking water should be a national goal. More proactive action than has been taken to date is needed to achieve it."[62] Accordingly, the Report calls for the LCR to encourage all PWSs to establish a LSL replacement program "that effectively informs and engages customers to share appropriately in fully removing LSLs."[63] The Report gives a suggested replacement schedule, which begins with a target of 15% of the initial number of LSLs replaced every three-year increment, gradually reduces replacement targets after fifteen years, and concludes with full LSL replacement after thirty years.[64] This proposal departs from the current LCR's policy of requiring LSL replacement only for PWSs that exceed their lead action level[65] and would thus seem to embody a more proactive effort to remove the main source of lead in drinking water.

However, this apparent improvement is undermined by the Report's failure to recommend enforcement measures for the LSL replacement requirements in the revised LCR.[66] The Report recommends that LCR violations would only occur when there are inadequacies in a PWS's customer-outreach efforts, or when a PWS fails "to step up intensity of efforts" if it does not meet its three-year LSL replacement targets.[67] Conspicuously absent is a mechanism for actual enforcement of LSL replacement targets. The LCR must do more than merely *encourage* LSL replacement. The Report appears to suggest that EPA's powers under the SDWA are insufficient to require proactive full LSL replacement,[68] but such a suggestion has no legal basis.[69] Failure by a PWS to reach LSL replacement goals should constitute a violation of the LCR.

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[62] Working Group Report at 13.

[63] *Id.* at 14.

[64] *Id.* at 45.

[65] 40 C.F.R. § 141.84(a).

[66] In contrast, the current LCR institutes a strict schedule of LSL replacement (at least seven percent per year) for PWSs that exceed the lead action level. 40 C.F.R. § 141.84.

[67] LCR WG Report at 19.

[68] *Id.* at 13 ("[removing the sources of lead in drinking water] will require a concerted effort by many, and cannot be accomplished solely through the authorities provided under the Safe Drinking Water Act. . . .").

[69] It is true that the current policy of making PWSs responsible for replacing only those LSLs that they are deemed to own—leaving property owners responsible for the LSLs running under their property—has been a major obstacle to full LSL replacement, but nothing in the SDWA or any other law demands that EPA continue this misguided policy. This issue is discussed in further detail below.

Partial LSL Replacement

The Report notes that the current LCR does not create sufficient incentives to remove and replace the entire length of each LSL—the main source of lead in drinking water—and instead creates a regulatory environment that has encouraged widespread partial LSL replacement.[70] The Report also cites studies showing that partial LSL replacement is ineffective at reducing the amount of lead in drinking water and leads to elevated lead levels in the short term.[71] But the Report does not follow this line of reasoning to its logical conclusion and recommend a prohibition against partial LSL replacement. Instead, it provides a list of "justifiable exceptions" to the general policy of encouraging full LSL replacement, including: "emergency repairs where property owners have refused to participate in a full LSL replacement; during a main replacement project; or when a sufficiently high percentage of property owners participate in an area –wide LSL replacement project to justify replacing LSLs to the property lines of those who do not participate at the time."[72] This list of recommended exceptions is completely at odds with the goals for the LCR long-term revisions, and threatens to undermine the public health-protection purposes of those revisions.

The revised LCR should ban partial LSL replacement. As an initial matter, the Report does not document the need for an "emergency repair" exception that would justify replacing less than one hundred percent of an LSL. Moreover, the above list of exceptions has troubling implications for environmental justice that mirror a major inequity of the current LCR lead-control regime. In many cities, property owners unable to pay to replace the LSLs running under their property were subjected to partial LSL replacement when their PWS replaced utility-owned LSLs up to the property line. Because partial LSL replacement can increase lead levels short term and has been shown to be ineffective at remediating lead contamination long-term, the current LCR's mandatory LSL replacement measures had the perverse result of *increasing* the amount of lead flowing through the taps of many consumers. A person's ability to pay thus became a major determinant of the level of lead contamination in her and her family's water in many places.

In focusing on property owners who have "refused to participate in a full LSL replacement," the Report appears to have missed the point. While there may exist homeowners who refuse to consent to full LSL replacement out of recalcitrance, by far the more pressing obstacle arises from lack of financial resources. Allowing partial LSL replacement to proceed when a "sufficiently high percentage" of customers in an area elect to participate would expose some unfortunate people to the known dangers of partial LSLs, **simply because of their inability to pay**. To its credit, the Report does call for "risk management" measures for

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[70] LCR WG Report at 19.

[71] *Id.*

[72] *Id.* at 14.

customers left with partial LSLs, such as providing filters and plastic piping,[73] but such stopgap measures are no substitute for full LSL removal.

Service line ownership

The current approach to questions concerning the ownership and control of LCRs is directly tied to an increased likelihood of partial LSL replacement. Service lines include portions owned by utilities as well as portions deemed to be owned by individual customers. Under the current LCR, a PWS is responsible for replacing only the portion of an LSL that it owns; for any remaining portion that is deemed to be privately-owned, the PWS is only required to offer to replace that portion of the LSL at the customer's expense.[74] The LCR's apportionment of shared responsibility for LSL replacement between utility and customer is a major reason for the prevalence of partial LSL replacement, as customers are often unable to shoulder the expense of replacing their portion of a service line, which is typically estimated to range from $1,000 to $7,000.[75] Additionally, PE materials provided by PWSs may fail to adequately inform customers of the public health purpose of LSL replacement, the nature of utility and homeowner rights and responsibilities regarding service lines, and the comparative benefits and risks of full LSL replacement and partial LSL replacement.[76]

The Report states that the Working Group discussed but did not reach a consensus on the question of whether the LCR should make PWSs responsible for replacing LSLs under their "control," which could encompass LSLs deemed to be owned by customers where the PWS has the authority to repair, replace, or maintain the LSL.[77] A control-based approach would support full LSL replacement. In contrast, the Report's continued emphasis on having customers "share appropriately" in LSL replacement threatens to perpetuate the existing inequities of the LCR's shared responsibility system. Over twenty years of history have shown that when property owners are asked to pay for full LSL replacements, the vast majority decline to do so, many for no reason other than inability to pay. In Washington, D.C. for example, through the duration of the city's service line replacement program from 2003 to 2008, only 15% of property owners

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[73] *Id.*

[74] 40 C.F.R. § 141.84(d).

[75] *See* Yanna Lambrinidou and Marc Edwards, Improving Public Policy through Qualitative Research: Lessons from Homeowners about Lead Service Line Replacement under the Federal Lead and Copper Rule (presentation at 141st APHA Annual Meeting and Expo, Nov. 2-6, 2013, Boston, MA).

[76] *Id.*

[77] LCR WG Report at 18.

elected to have a full replacement—2,128 out of 14,260 service lines that were ultimately replaced.[78]

Among other failings, use of the "ownership" test presumes that (1) the property owner is knowingly assuming the risk of leaving private-owned LSLs in place, (2) the property owner is in fact the one who will be exposed to this risk, and (3) that everyone has the ability to pay for LSL replacement if they deem the risk significant. None of these assumptions is true. First, unless and until public education efforts are significantly ramped up and have had sufficient time to penetrate the public consciousness, property owners will be largely unaware of the risks they are assuming when choosing partial LSL replacement. Second, those renting their homes will likely have no say in the matter at all. Home ownership rates, which are low in general among the nation's poorest families,[79] are disproportionately low for African Americans and certain other racial/ethnic groups, as well.[80] Lastly, and most importantly, a property owner's ability to pay should not affect her risk of lead exposure. The "ownership" test prejudices poor families and families of color, and hurts families who are not adequately informed of the risks of lead exposure.

The Report attempts to resolve this last failing by suggesting research into "creative financing possibilities," such as a possible IRS tax refund to families who choose full LSL replacement, but none of its suggestions are adequately explained and none address the other failings of the "ownership" test. The problem is that by dividing responsibility, the "ownership" test requires complicated solutions. Some entity has to come up with funding, which it can give to the property owner, who can then pay the PWS. Control is much simpler to establish, greatly reduces the number of actors and decision-makers involved, and avoids the need for complex financing solutions to mitigate environmental justice concerns

The Report points to state prohibitions on spending public funds on private property and the difficulty of gaining physical access to private property as major obstacles to a control-based LSL replacement scheme,[81] but these are more easily surmounted than the difficulties of

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[78] The District of Columbia and Communities Nationwide Face Serious Challenges in Their Efforts to Safeguard Water Supplies, GAO-08-687T at 6-8 (April 15, 2008); *see also* GAO-05-344, *Agencies Have Improved Coordination, but Key Challenges Remain in Protecting the Public from Elevated Lead Levels*, Report to the Chairman, Subcommittee on Environment and Hazardous Materials, Committee on Energy and Commerce, House of Representatives (March 2005), p. 4 (raising the same concerns as in 2005).

[79] http://www.huduser.gov/Publications/pdf/HomeownershipGapsAmongLow-IncomeAndMinority.pdf at 91

[80] http://www.huduser.gov/Publications/pdf/HomeownershipGapsAmongLow-IncomeAndMinority.pdf at 85

[81] LCR WG Report at 18.

implementing the current ownership-based system. The public benefit doctrine found in many state constitutions poses no barrier to an LSL replacement program that clearly aims to promote public health. The application of this doctrine may vary from one state to another, but in general a public purpose "has for its objective the promotion of public health, safety, morals, security, prosperity, contentment, and the general welfare of the community."[82] The term "public purpose" is broad and should not be construed "in a narrow or restrictive sense."[83] A public purpose may be served even if it involves making payments to individuals.[84] Additionally, property rights can be respected by requiring the PWS to obtain a "right of entry" from property owners—a choice that will not depend on owners' ability to pay. Lastly, funding for replacement projects can be obtained in numerous ways, with the unifying characteristic that only one party, the PWS, needs to be involved in the transaction.

Nor does the history of litigation over the 1991 LCR justify retaining the ownership approach. In response to a challenge by the American Water Works Association, the D.C. Circuit struck down EPA's definition of "control" in the final 1991 rule, solely on the grounds that "EPA failed to provide adequate notice that it would adopt a novel definition of control."[85]

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[82] Slawson v. Alabama Forestry Comm'n, 631 So.2d 953, 956 (Ala. 1994); Clifford v. City of Cheyenne, 487 P.2d 1325, 1329 (Wyo. 1971); Platte Valley Public Power & Irrigation Dist. v. Lincoln County, 14 N.W.2d 202, 205 (Neb. 1944); State ex rel. McClure v. Hagerman, 98 N.E.2d 835, 838 (Ohio 1951); Greensboro-High Point Airport Authority v. Johnson, 226 N.C. 1, 15 (N.C. 1946); State ex rel. Warren v. Nusbaum, 59 Wis.2d 391, 423 (Wis. 1973); City of Pipestone v. Madsen, 287 Minn. 357, 366 (Minn. 1970).

[83] Burkhardt v. City of Enid, 771 P.2d 608, 610 (Okla. 1989); Madison Cablevision, Inc. v. City of Morganton, 325 N.C. 634, 646 (N.C. 1989); Dannheiser v. City of Henderson, 4 S.W.3d 542, 546 (Ky. 1999) (and cases cited therein).

[84] See Ullrich v. Bd. of Cnty. Comm'rs of Thomas Cnty., 234 Kan. 782, 788-89 (Kan. 1984) ("The generally recognized rule is that a state legislature may appropriate public money or property for private individuals, if thereby the public welfare is promoted."); see also Mountain Water Co. v. Montana Dept. of Public Service Regulation, 919 F.2d 593, 601 (9th Cir. 1990) (upholding a requirement applicable to privately-owned water utilities "to help assure service line maintenance [and] redistribute the cost of service line maintenance among all customers.").

[85] *Am. Water Works Ass'n v. E.P.A.*, 40 F.3d 1266, 1275 (D.C. Cir. 1994). The D.C. Circuit viewed EPA's definition of "control" as novel because "public water systems generally *own* only that part of the service line that underlies public property." *Id*. at 1274. (emphasis added). However, the proposed rule had clearly rebuttable presumption "that the water supplier owns *or controls* and therefore can replace, *the lead components up to the wall of the building served*." Drinking Water Regulations; Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, 53 Fed. Reg. 31516, 318548 (Aug. 18, 1988). The court also reasoned that the only case to have interpreted the definition of "public water system" was a 1988 ruling of the Georgia Supreme Court interpreting the Georgia Safe Drinking Water Act,

Any questions regarding the scope or meaning of "control" could be addressed in a new rulemaking that provides ample public notice to affected PWSs. To the extent there is any merit to the American Water Works Association's substantive allegations against the 1991 control rule – that EPA lacked authority to adopt a control-based rule, and that the definition was impermissibly vague because EPA did not indicate whether the rule created a right of entry on private property – EPA can address those issues in a new rulemaking.

LSL inventory

An additional defect in the Report's LSL replacement proposal is its LSL accounting scheme. The Report has two related recommendations for improving PWSs knowledge of LSLs within their system:

1) A "presumption that a service line put in place prior to the date when lead service lines were prohibited has leaded materials unless the PWS has information to confirm that it [does] not."
2) "Providing credit to a PWS toward its replacement goals for demonstrating that a service line presumed to include lead does not have leaded materials."

This second suggestion serves only to undermine the stated purpose of the LSL replacement program and could lead to significant delays in implementing full LSL replacement. Giving "credit" for existing service lines that do not contain lead would allow a PWS to replace *fewer* LSLs than it would otherwise have to in a given year, a result squarely contrary to the goal of rapid LSL replacement. It would also create a perverse incentive for PWSs to characterize as lead-free service lines that are of uncertain or ambiguous composition. Because this recommendation has no apparent public health justification, EPA should reject it and instead focus on different ways to require or incentivize accelerated LSL inventories by all PWSs.

B. Monitoring

If implemented, the Report's recommendations regarding lead monitoring would likely result in a weaker monitoring regime than the current LCR's. PWSs are currently required to

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which was identical to the definition of a PWS under the SDWA, as "confining the regulatory authority to portions of the service line *not underlying private property*." *Am. Water Works Ass'n* at 1275, citing *Bass v. Ledbetter,* 257 Ga. 738, 363 (Ga. 1988) (emphasis added). But EPA's proposal clearly went beyond the Georgia court's interpretation by presuming that "lead components up to the wall of the building served" could be within a PWS's "control." Nonetheless, because EPA had given "control" a specific definition that was not articulated in the proposed rule, and had deviated from the Georgia court's interpretation of "PWS" under the state's law, the D.C. Circuit concluded that interested parties could not "reasonably have anticipated the final rulemaking." *Am. Water Works* at 1275.

measure levels of lead in their water through periodic monitoring, which includes targeted tap water sampling,[86] source water monitoring,[87] and monitoring of Water Quality Parameters ("WQPs") at various points in the system.[88] Data collected on WQPs, including , alkalinity, conductivity, temperature, and calcium, is used to assess the corrosivity of the water supply.[89] Data obtained from sampling at individual drinking water taps is used to ascertain whether a PWS exceeds the LCR's Lead Action Level, which triggers mandatory response measures such as LSL replacement.[90] The Report finds fault in the current monitoring regime, citing "numerous challenges" and focusing in particular on "difficult and costly" in-home tap water sampling.[91] The Report recommends replacing the LCR's monitoring program with the following 2-part program: "1) a more robust WQP monitoring program to improve process controls for CCT, and 2) voluntary customer initiated sampling. . . to provide direct information to consumers that they can use to reduce potential exposures to lead from drinking water. . . and to provide ongoing information to the PWS to identify and correct unanticipated problems. "[92] The Report also calls for increased customer outreach to encourage voluntary tap sampling, including a "menu" of sampling protocols for customers to choose from.[93]

This proposal is deeply misguided. As noted above, WQP monitoring was instituted under the 1991 Lead and Copper Rule as a means for assessing the corrosivity of water. The Report offers no evidence that WQPs provide a reliable indicator of lead levels at consumers' taps.[94] Surrogate measuring should only be used when direct measuring of a contaminant is prohibitively costly or otherwise impossible *and* where the surrogate measure provides the most reliable indirect measure of the presence of the targeted contaminant. This is not the case with lead, which can be readily measured in tap samples and for which WQPs cannot not provide a reliable surrogate measure. The Report fails to justify deemphasizing targeted tap sampling in favor of a method known to be a less reliable indicator of lead levels. Simply put, the most reliable way to ascertain lead levels at consumers' taps is to measure lead levels at

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[86] 40 C.F.R. § 141.86.

[87] 40 C.F.R. § 141.88.

[88] 40 C.F.R. § 141.87.

[89] 1991 Lead and Copper Rule, 56 Fed. Reg. at 26466.

[90] 40 C.F.R. § 141.84(a).

[91] LCR WG Report at 30, 32.

[92] *Id.* The Report notes, "[i]t seems appropriate to include some sort of floor to the number of customer samples. Some members of the [Working Group] suggested that systems should be required to collect no fewer samples in a three year period than they would under the current three-year reduced monitoring requirement." *Id.* at 34.

[93] *Id.*

[94] Dissent at 13.

consumers' taps. Eliminating mandatory, targeted tap water sampling and replacing it with voluntary, consumer-driven sampling would further undermine the goal of effectively monitoring lead levels. Because volunteer sampling assumes that consumers will have a sufficient understanding of the need for sampling, it is more likely to produce data from households that enjoy higher socio-economic status, education level, and English language skills. For that and other reasons, volunteer sampling according to consumer-chosen protocols would yield only sporadic data that would be of little use in ascertaining system-wide lead levels.

Effective tap water monitoring demands a systematic, targeted approach. Lead levels can vary greatly depending on location within a water system and over time,[95] so even tap sample data indicating low lead levels at a large number locations throughout a PWS can belie a situation in which some customers are being exposed to unacceptably high levels of lead. Accordingly, tap sampling should target the homes at highest risk of lead contamination, as mandated in the current LCR.[96]

There is ample room for improvement to the current LCR's tap water monitoring regime, but any changes should make tap monitoring more effective, not less so. For example, the current LCR mandates that nearly all tap samples be "first-draw" samples,[97] a technique that is now known to significantly underestimate actual lead levels.[98] Sampling protocols should be revised to reflect up-do-date scientific knowledge, including a ban on practices such as "pre-flushing" that are known to underestimate lead levels. Additionally, the LCR should mandate that uniform protocols be used throughout the system to ensure a consistent, useful pool of data on lead levels.

Sample invalidation

Under the current LCR a PWS can request that its state invalidate tap water samples for a limited number of reasons, such as damage to the sample container or error in laboratory analysis.[99] The Report asserts that this closed list of sample invalidation criteria leads to instances in which "samples that are obvious 'outliers' and don't represent the water that is normally consumed and should not be used as a basis for treatment changes or public education" must be accepted.[100] The Working Group urges EPA to "expand the invalidation

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[95] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26514.

[96] 40 C.F.R. § 141.86(a).

[97] 40 C.F.R. § 141.86(b).

[98] Dissent at 14.

[99] 40 C.F.R. § 141.86(f).

[100] LCR WG Report at 34.

criteria" to reflect this concern.[101] This proposal would create an unnecessary and potentially disastrous loophole. The current list of sample invalidation criteria focuses on errors in sample collection, without taking into account the testing results of a given sample. Expanding sample invalidation criteria to allow the exclusion of "outliers" could allow PWSs to disregard valid samples simply because their results show high lead levels. Such a policy would undercut the very rationale for having a sampling program, and it could become a means for a PWS to create the appearance of low overall lead levels while failing to address lead contamination in homes within the system. Under no circumstances should a PWS be allowed to invalidate an otherwise valid sample after seeing the testing results.

C. Corrosion Control Treatment

CCT is the most important aspect of the LCR's lead control treatment technique because it can dramatically reduce the amount of lead that leaches from lead pipes into drinking water if properly implemented. The current LCR CCT regime contains several flaws that prevent it from realizing this potential. Unfortunately, rather than addressing these flaws head-on, the Report's CCT proposals would likely result in a *weaker* CCT regime than the current LCR.

The goal of CCT is to minimize corrosion of lead-containing pipes, thus reducing the amount of lead leaching from those pipes into water destined for human consumption. Each PWS varies in factors such as size, source water, and age of the physical infrastructure, and each of these affects pipe corrosions. Accordingly, CCT needs to be calibrated to fit local circumstances. The LCR currently requires all large PWSs to develop optimal CCT, defined as CCT "that minimizes the lead and copper concentration at users' taps while insuring that the treatment does not cause the water system to violate any national primary drinking water regulations."[102] Small and mid-size PWSs are required to develop optimal CCT if they are unable stay below the action level for lead.[103] The LCR also requires that PWSs periodically assess their CCT through monitoring of WQPs, and PWSs able to maintain WQPs within established ranges are deemed to have effective CCT.[104]

This CCT regime has been marred by failures of implementation and flaws of design. To implement optimal CCT, the current LCR directs all large PWSs to conduct extensive studies and develop optimal CCT in cooperation with their respective states; the 1991 regulations provide a schedule of seven steps over six years (1993-1998) for them to complete this task.[105] Despite these clear instructions, few large PWSs conducted the studies necessary to develop

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[101] *Id.*

[102] 40 C.F.R. § 141.2.

[103] 40 C.F.R. § 141.82(a)(2).

[104] 40 C.F.R. § 141.82(g).

[105] 40 C.F.R. § 141.82(d).

optimal CCT.[106] Instead, most large PWSs have implemented ad hoc CCT with the goal of staying below the lead action level (15 parts per billion).[107] In effect, these PWSs have been held to a less stringent standard for CCT than the standard called for in the LCR's CCT optimization provisions, which demand that PWSs achieve *minimization* of lead levels. Regarding the current CCT assessment provisions, the LCR Working Group dissenter and others have pointed out that WQP monitoring is an imperfect indicator of actual lead levels. Indeed, only 172 PWSs have failed to maintain WQPs within established ranges since 1991, yet over 6,000 PWSs have exceeded the lead action level in that time.[108] In other words, that a PWS is able to maintain acceptable WQPs does not guarantee CCT achieving low lead levels at the tap.

The Report takes up both CCT optimization and CCT assessment. Noting that optimal CCT depends upon up-to-date science and attention to local conditions,[109] the report recommends that EPA develop a new CCT guidance manual "as soon as possible" and update the manual every six years; it also suggests that large PWSs be required to review their CCT plans in light of the updated manual and be required to do so in every six year rule review cycle.[110] To improve CCT assessment, the Report recommends that CCT be evaluated according to the "regular stream of data" from voluntary customer tap water sampling under the monitoring regime described above.[111] All customer sampling data would be compiled and reported to the state; if the most recent three years of customer sampling data shows the 90th percentile to be above the action level for lead, the PWS would be required to determine if "analysis, re-evaluation of CCT, or other actions. . . are appropriate."[112]

These recommendations do not adequately address the shortcomings of the current CCT regime, and linking assessment to voluntary customer tap sampling would further reduce CCT's efficacy. As noted above, switching from targeted tap sampling to voluntary, customer-initiated sampling would result in a much weaker pool of data about lead levels within a water system. Coupling CCT assessment to less accurate information about lead levels within a PWS can only weaken CCT. The Report's recommendations regarding CCT optimization would be a step in the right direction, but they do not go far enough in addressing the history of large PWSs failing to comply with the LCR's explicit directives on CCT optimization.

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[106] Dissent at 14.

[107] *Id.*

[108] *Id*. at 13.

[109] LCR WG Report at 29.

[110] *Id.* at 30.

[111] *Id*. at 33.

[112] *Id.* Although three years of sampling data would be used to calculate the 90th percentile, PWSs could be required to report sampling data annually "at the discretion of the primacy agency."

CCT is a science-based treatment technique that requires accurate information on actual lead levels, continual monitoring, and attention to the individual circumstances of each PWS. Although the precise contents of an effective CCT regime are beyond the scope of this comment, the dissenting Working Group member suggests that it will require at minimum: (1) robust monitoring of lead levels in water; (2) true CCT optimization in large PWSs, i.e. CCT that minimizes lead corrosion without violating other national water quality standards; (3) mandatory corrective action by a PWS if the lead action level is exceeded; and (4) a compliance mechanism that links CCT to lead levels at the tap.[113]

D. Household Action Level

The Report's proposal to establish a household action level for lead addresses an important gap in the LCR, but it needs to be bolstered if it is to adequately fill that gap. The current LCR calculates the lead action level with reference to the 90th percentile of all tap water samples in a system. Accordingly, samples from individual dwellings can contain high levels of lead without triggering the lead action level for the PWS as a whole. The Report calls for the creation of a "household action level" to address this problem: if a tap sample exceeds the household action level, the PWS would be required to notify local health departments and the state drinking water authority.[114] This proposal addresses an important gap in the current LCR, but in its current form its efficacy is limited. The proposed household action level does not mandate any action by health departments upon notification of an exceedance of the household action level, nor can it, as the SDWA does not give EPA authority to regulate local health departments. The Report acknowledges as much, incongruously stating, "while the LCR cannot guarantee actions by health departments, this recommendation provides direct health intervention in those cases where sampling indicates high lead levels.[115] Instead of merely providing that PWSs notify local health authorities of exceedances of the household action level, the LCR should require PWSs to take immediate remedial action in the affected homes and to ensure that the affected residents have adequate health safeguards until the danger is eliminated.

E. Public Education

Public Education ("PE") is an essential part of the LCR. The public remains under-informed of the dangers of lead contamination of drinking water, and of the "shared responsibility" the LCR expects them to take to protect themselves and their families. The

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[113] Dissent at 15.

[114] LCR WG Report at 36. The Working Group recommends that the household action level be set with reference to the amount of lead it would take to induce an average, healthy infant drinking formula to have blood lead levels of greater than five micrograms per deciliter. *Id.* at 37.

[115] *Id.* at 32-33.

Report calls for greater efforts to disseminate information about the risks of lead contamination in drinking water through PE materials. Specifically, it recommends establishing a "national clearinghouse" of PE materials for use by PWSs; requiring PWSs to send PE materials to all new customers; revising the language of Consumer Confidence Reports ("CCRs"); requiring PWSs to make publicly available information about LSLs and other information related to lead contamination; and expanding outreach to health care providers serving populations vulnerable to lead poisoning.[116] These proposals would do much to improve PE regarding lead contamination of drinking water, and several suggestions to further improve this facet of the LCR are included below.

However, both the current LCR and the Report leave unaddressed two of the most serious contributors to spikes in lead contamination of drinking water: physical disturbance of lead-containing pipes and period of disuse of lead-containing pipes. These pressing problems are described in further detail below.

Revisions to CCR language

SDWA regulations require PWSs to deliver annual CCRs to customers for any contaminants detected in their water.[117] The Report includes suggested revisions to the language of the CCR for lead to reflect up-to-date science, notify customers of resources available in the national clearinghouse, and emphasize that "customers play an important role in protecting themselves from exposure to lead."[118] As a "starting point," it recommends adding the following language:

> Your water utility is required to minimize the corrosivity of the water. However, because every home is different, the amount of lead in your tap water may be lower or higher than the monitoring results for your public water system as a whole. You can take responsibility for identifying and removing lead materials within your home plumbing and taking steps to reduce your family's risk. If you have lead service lines or lead-bearing materials in your home, [you may wish to have your water tested.][119]

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[116] LCR WG Report at 21-22.

[117] 40 C.F.R. § 141.151(a). The current CCR language for lead can be found at 40 CFR § 141 Appendix A to Subpart O.

[118] LCR WG Report 24.

[119] *Id*. Bracketed portion is language from the current CCR.

Improving the efficacy of CCR is an important goal, but the Report's emphasis on CCR ignores the documented inadequacies of that medium as an educational vehicle.[120] Furthermore, this suggested language does not do enough to inform water consumers of the role the LCR regime expects them to play in protecting themselves from preventable exposures to lead contamination.

Transparency

The Report recommends that the LCR require PWSs to make available to the public information regarding: 1) "the number of samples over the Household Action Level, median, 90th percentile, and highest level found in the last monitoring period" and 2) "CCT treatment, approved WQP ranges and WQP results from the last monitoring period."[121] It also recommends that EPA "encourag[e]" PWSs to provide information on PE materials, sampling protocols, individual sampling results, and inventory/maps of LSLs.[122] These proposals to increase the amount of information available to consumers would be strengthened by *requiring* that PWSs provide the information that the Working Group recommends EPA only *encourage* PWSs to provide.

IV. Issues not Addressed in the LCR Working Group Report

Beyond the discrete issues identified above, the Report omits or gives insufficient attention to two important aspects of the problem of lead contamination of drinking water that must be addressed in the LCR long-term revisions: exposure factors now known to cause spikes in lead levels at drinking water taps, and the persistence of disparities in exposure to lead-contaminated water based on income, race, and ethnicity.

Physical Disturbances and Scale Deterioration

Scientific knowledge of the problem of lead contamination has advanced in the twenty-four years since the LCR was first promulgated. We now know that two of the most significant factors contributing to elevated lead levels in drinking water are physical disturbance of lead-containing pipes and deterioration of protective scales coating the interior of such pipes during prolonged disuse. While the Report mentions both issues in passing, it does not recommend robust actions to address these factors through revisions to the LCR. The gravity of the risk to public health from these two exposure factors warrants greater attention

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[120] Dissent at 8 (citing studies that document or otherwise bear on the inadequacy of CCR alone as a medium for communicating health risks. Among other reasons, CCR is not sufficiently urgent, repetitive, or targeted to those most at-risk).

[121] LCR WG Report at 28.

[122] *Id.* at 25.

Studies by EPA scientists have shown that physical disturbances in particular can cause acute spikes in lead levels, temporarily exposing consumers to dangerously high amounts of lead in their water even in areas deemed safe by current monitoring practices.[123] Any activity that physically disrupts an area in proximity to service lines can cause a physical disturbance, from PWS maintenance to roadwork to private construction. The difficulty inherent in addressing this issue is compounded by the fact that not only PWSs, but a variety of public and private actors outside the direct regulatory reach of the SDWA and LCR undertake activities that lead to such disturbances. To its credit, the Report recommends requiring PWSs to inform other utilities whose work might affect LSLs about how to both manage potential disturbances and communicate with residents of affected homes about risks and risk mitigation measures.[124] This is an important first step in addressing one of the most important contributors to lead contamination of drinking water, but much more needs to be done. We urge EPA to begin immediately exploring mandatory preventative and remedial measures to address physical disturbance in the LCR revisions, including expedited full LSL removal.

Similarly, advances in scientific understanding since 1991 have revealed that effective CCT requires regular flows of treated water to create and maintain the scale that forms a protective barrier between lead pipes and water destined for human consumption.[125] Periods of disuse, such as when a residence is unoccupied, can lead to deterioration of that protective scale. When use resumes, such as when new occupants move in, particles of the scale itself can break off and enter the water. Not only does this leave pipes with gaps in the protective barrier, it creates an acute risk of lead contamination because particles of the deteriorated scale may contain extremely high amounts of lead. This factor is of particular concern from an environmental justice perspective because, among other reasons, foreclosure-related vacancies are concentrated in neighborhoods with large Hispanic and Black populations.[126] The Report does not address this known risk.

As noted in the PE section above, it is imperative that consumers be informed of the dangers posed by physical disturbances and scale deterioration as well as steps they can take to protect themselves and their families. However, PE alone is not sufficient to address the danger posed by these two issues, which also highlight the necessity of removing all LSLs from water systems as quickly as possible, before an event triggers a sudden release of lead into drinking water. In the interim, EPA must take further action to address the threat posed by these issues

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[123] Del Toral, M. A. et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *ES&T* 47(16): 9300–9307.

[124] LCR WG Report at 18.

[125] Arnold, R., and M. Edwards. 2012. Electrochemical Reversal of Galvanic Pb:Cu Pipe Corrosion. *ES&T*46(20):10941-7.

[126] Matthew Hall, et al., Neighborhood Foreclosures, Racial/Ethnic Transitions, and Residential Segregation (2015), *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4479290/.

until all LSLs are removed from the nation's water systems, whether in through the revised LCR or some other regulatory mechanism. We therefore also urge EPA to explore mandatory preventative and remedial measures in the LCR revisions to address the particular risks to new occupants of long-vacant homes.

Environmental Justice

Gross disparities in the impact of lead-contaminated water along lines of income, race, and ethnicity persist nearly two and a half decades after the promulgation of the LCR. EPA acknowledged this when it made addressing environmental justice concerns an explicit goal of the LCR long-term revisions.[127] While the Report mentions "important questions of disparate impact and environmental justice," it fails to confront these questions in a manner commensurate to their gravity. In several instances its recommendations would even exacerbate these inequities. As noted above, the well-known consequences of partial LSL replacement fall heavily on those who cannot afford to pay to replace LSLs running under their property. More broadly, because lead contamination affects low-income, black, and Hispanic populations disproportionately, any weakening of LCR's treatment technique or failure to institute an effective LSL replacement program will be felt more acutely by these populations as well.

The "shared responsibility nature of the LCR"[128] is not an excuse to leave vulnerable individuals and communities to fend for themselves in the face of a weakened treatment technique and an aspirational LSL replacement regime with no mechanism for ensuring removal of all dangerous LSLs. The stakes are too high in light of the lifelong consequences of lead poisoning, especially for the young. The revised LCR must address the socioeconomic and racial inequities in lead contamination of water head-on.

CONCLUSION

The LCR Working Group Report contains many good and important suggestions to improve the LCR. It has significant shortcomings and omissions as well. A strength of the LCR long-term revisions process is the opportunity for due deliberation, and EPA should not accept the Report's recommendations without critical examination. As EPA considers the Report and NDWAC's recommendations and proceeds with revising the LCR, we urge that it keep the public health-protective purpose of the SDWA and the interests of environmental justice as the core driving factors in the LCR long-term revision process.

Sincerely,

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[127] EPA, LCR Long-term Revisions White Paper, available at:

http://water.epa.gov/drink/ndwac/upload/lcrwgmeetsumaxd32514.pdf (last visited 11/06/15).

[128] LCR WG Report at 19.

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RE: Comments on the Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council

Dear Mr. Grevatt and Members of the National Drinking Water Advisory Council:

Please accept the following comments on the Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council.

INTRODUCTION

The recent public health crisis in Flint, Michigan is only the latest example of the ongoing danger of lead contamination in the nation's drinking water. The upcoming revisions to the Lead and Copper Rule ("LCR") represent an opportunity for EPA to make essential improvements to the most important regulatory mechanisms for removing lead from the drinking water consumed by millions of people in the United States.

The Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council ("the Report") contains many important suggestions for improvement to the LCR. EPA should take special note of the Report's reassessment of the LCR based on the growing body of scientific knowledge about lead contamination of drinking water as well as documented problems with the LCR's implementation since the rule was first promulgated in 1991. In particular, the Report highlights the importance of replacing *all* known lead service lines ("LSLs") in light of the fact that there is no safe level of lead exposure, and the fact that the risk of contamination is present whenever water makes contact with lead plumbing. The Report's proposals to establish a household action level for lead and to strengthen the LCR's public education provisions would also represent important improvements to the rule.

However, the revised LCR will require significant modifications and additions beyond those proposals put forth in the Report if it is to be sufficiently protective of public health. Provisions for ensuring proactive replacement of all LSLs must be accompanied by robust accountability mechanisms to ensure that public water systems ("PWSs") fulfill their replacement obligations. The household action level and public education proposals will likewise need to be bolstered to ensure their efficacy. Furthermore, if implemented, the Report's proposals regarding customer tap sampling, corrosion control treatment, and LSL inventory would likely *diminish* the efficacy of current LCR provisions in these areas. EPA must reject these regressive proposals in order to avoid backsliding in the LCR.

The Report also omits or gives insufficient attention to some of the most important contributors to lead contamination of drinking water currently unaccounted for in the LCR: physical disturbance of lead-containing pipes and periods of disuse of such pipes when a residence is unoccupied. Both of these can lead to dangerous spikes in lead levels at the tap. Additionally, the Report fails to address one of the greatest obstacles to effective, equitable implementation of the current LCR: its "shared responsibility" approach that holds household residents largely responsible for protecting themselves from lead-contaminated drinking water, regardless of their ability to bear the significant costs of doing so. As discussed in further detail below, the current approach to this shared responsibility regime has contributed to widespread instances of partial LSL replacement, in many cases due to the residents' inability to pay for full LSL replacement—a practice that can actually increase lead levels in drinking water. For this and other reasons, the impact of lead-contaminated water is distributed disproportionately along lines of class, race, and ethnicity. The revised LCR must do more to ensure that lead-free water is available to everyone served by a PWS.

The Report is the culmination of months of hard work by the LCR Working Group, and EPA should pay close attention to the important suggestions to improve the LCR it contains. However, as EPA carries out the LCR long-term revisions process it should be aware that the LCR revisions will need to go well beyond the recommendations in the Report if they are to achieve their public health-protection objectives. The dangers of lead contamination are too great to allow for anything less.

I. Background on Lead

Lead is a dangerous neurotoxin that persists in the environment and bioaccumulates when taken into the human body. Scientific consensus shows that there is no safe level of lead exposure.[1] EPA and the Center for Disease Control ("CDC") have recognized this.[2]

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[1] *See* EPA, Basic Information about Lead in Drinking Water, last updated Mar. 6, 2012, http://water.epa.gov/drink/contaminants/basicinformation/lead.cfm ("[T]he best available science . . . shows there is no safe level of exposure to lead.").

In children, lead exposure is known to cause "[p]ermanent damage to the brain and nervous system, leading to behavior and learning problems, lower IQ, and hearing problems," slowed growth, anemia, and, "[i]n rare cases . . . seizures, coma and even death."[3] Lead is especially dangerous for children because it acts on their developing brains and nerves.[4] Lead exposure has been linked to neurological and behavioral problems, including attention-deficit/hyperactivity disorder, criminal behavior, and a need for special education.[5] There is substantial evidence that lead exposure negatively impacts children's IQ and academic performance.[6] For adults, lead exposure can cause nervous system effects, cardiovascular effects, increased blood pressure, decreased kidney function, and reproductive problems for adults of both sexes.[7] Further, lead can accumulate for decades in a person's bones.[8] Certain circumstances—including pregnancy, breaking a bone, and old age—cause accumulated lead to be released back into the bloodstream and the organs where it can cause damage years after initial exposure.[9]

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[2] *See*, *e.g.*, CDC, What do Parents Need to Know to Protect Their Children (2012), available at http://www.cdc.gov/nceh/lead/ACCLPP/blood_lead_levels.htm ("'The most important step parents, doctors, and others can take is to **prevent lead exposure before it occurs**.'"); CDC, Lead in Drinking Water and Human Blood Lead Levels in the United States (2012), available at http://www.cdc.gov/mmwr/preview/mmwrhtml/su6104a1.htm?s_cid=su6104a1_w ("Because lead accumulates in the body, all sources of lead should be controlled or eliminated to prevent childhood lead poisoning.").

[3] EPA, Learn About Lead, last updated Apr. 1, 2013, http://www2.epa.gov/lead/learn-about-lead.

[4] National Library of Medicine, MedlinePlus: Lead poisoning, last updated Feb. 1, 2013, http://www.nlm.nih.gov/medlineplus/ency/article/002473.htm

[5] CDC, CDC's Healthy Homes/Lead Poisoning Prevention Program, 2 (2012), *available at* http://www.cdc.gov/nceh/information/program_factsheets/lead_program_overview.pdf

[6] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, ix (2012), *available at* http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[7] EPA, Learn About Lead, last updated Apr. 1, 2013, http://www2.epa.gov/lead/learn-about-lead. *See also* California DTSC, Requirements for Low Lead Plumbing Products in California, (2011), *available at* http://www.dtsc.ca.gov/PollutionPrevention/upload/Lead-in-Plumbing-Fact-Sheet.pdf ("For adults, high levels of exposure to lead in drinking water can result in kidney problems, high blood pressure, nerve disorders, fertility problems, muscle and joint pain, irritability, memory and concentration problems.").

[8] ATSDR, Toxicological Profile for Lead, 7–8 (2007), *available at* http://www.atsdr.cdc.gov/toxprofiles/tp13.pdf.

[9] *Id.*

Children in the United States continue to show high levels of lead in their blood.[10] "Childhood blood lead levels in the United States differ across groups in the population, such as those defined by socioeconomic status and race/ethnicity."[11] Blood-lead levels ("BLLs") tend to be higher for children living in older housing, and children who suffer nutritional deficiencies.[12] There are also significant disparities in the way that lead contamination affects different racial and ethnic groups: "About 22% of African American children and 13% of Mexican American children living in pre-1946 housing are lead poisoned, compared with 6% of white children living in comparable types of housing."[13] The National Black Environmental Justice Network notes that "Black children are five times more likely than white children to have lead poisoning [and] 1 in 7 black children living in older housing has elevated blood lead levels."[14] The CDC has noted that, based on data from the 1999-2002 and 2007-2010 National Health and Nutrition Examination Survey, "disparities in the [geometric mean] BLL by factors such as race/ethnicity and income level, which have been important historically, persist."[15]

Additionally, because lead is absorbed into children's bones and accumulates, disparate exposure from others sources compound the dangers of lead for children in certain vulnerable communities.[16] For example, "[c]hildren living in poverty and Black non-Hispanic children tend to have higher blood lead levels and higher levels of lead-contaminated dust in the home than do other children," making them especially vulnerable to additional lead exposure coming from their water.[17] Differences in mean BLLs can be traced to differences in housing quality, which can affect water supplies, environmental conditions, nutrition, and other factors that often result

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[10] *See*, *e.g.*, CDC, Blood Lead Levels in Children Aged 1–5 Years — United States, 1999–2010 (Apr. 5, 2013), *available at* http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6213a3.htm?s_cid=mm6213a3_e ("An estimated 535,000 U.S. children aged 1–5 years had BLLs ≥5 μg/dL.").

[11] EPA, America's Children and the Environment, 119 (3d ed., 2013), *available at* http://www.epa.gov/opeedweb/children/publications/ACE3_2013.pdf. See also, e.g., America's Children and the Environment, chart on page 125.

[12] EPA, America's Children and the Environment, at 119.

[13] NBEJN, Lead Facts in Black and White and Green, 2 (2005), *available at* http://www.nbejn.org/factsheets/LeadNBEJN-05new.pdf.

[14] *Id.*

[15] CDC, Blood Lead Levels in Children Aged 1–5 Years — United States, 1999–2010 (Apr. 5, 2013), *available at* http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6213a3.htm.

[16] *See*, *e.g.*, EPA, Lead in the Air: Health, last updated Mar. 13, 2012, http://www.epa.gov/oaqps001/lead/health.html ("Once taken into the body, lead distributes throughout the body in the blood and is accumulated in the bones.").

[17] EPA, America's Children and the Environment, at 119.

in the existence of notable racial and income disparities in BLLs.[18] Maternal nutrition can also affect the lead exposure of children, both during and after pregnancy.[19]

The CDC has also recognized that even very low BLLs can cause significant harm to children.[20] It has abandoned its prior practice of defining the "blood lead level of concern" as 10 μg/dL or greater, based on a strong body of evidence that BLLs below 10 μg/dL are associated with significant health effects. In particular, at BLLs less than 10 μg/dL children are reported to suffer irreversible "cardiovascular, immunological, and endocrine effects," IQ deficits, attention deficit disorders and decreased academic performance.[21] The CDC has created a new reference value requiring action, 5 μg/dL. The CDC found that "[t]here are approximately 450,000 U.S. children with BLLs above [the CDC's suggested reference value of 5 μg/dL] that should trigger lead education, environmental investigations, and additional medical monitoring."[22]

For many years, drinking water has been, and continues to be, a significant source of lead exposure.[23] A 2010 CDC study "found that children living in houses with lead pipes were three times as likely to have elevated blood lead as children in houses without lead pipes."[24] "Adults absorb 35%-50% of the lead they drink, and the absorption rate for children may be greater than 50%."[25] The Children's Health Protection Advisory Committee has stated that "it

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[18] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, x (2012), available at http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[19] *See* EPA, Learn about Lead, last updated Apr. 1, 2013, http://www2.epa.gov/lead/learn-about-lead ("During pregnancy, lead is released from bones as maternal calcium is used to help form the bones of the fetus. This is particularly true if a woman does not have enough dietary calcium. . . . Lead can also be transmitted through breast milk.").

[20] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, ix (2012), *available at* http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[21] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, ix (2012), *available at*http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[22] *Id.* at x.

[23] *See, e.g.*, WHO, Childhood Lead Poisoning, 44 (2010) ("Lead plumbing . . . has contaminated drinking-water for centuries, and lead in water can contribute to elevated blood lead concentrations in children"); New York City, New York City Plan to Eliminate Childhood Lead Poisoning, 21 (2005) (identifying the protection of "infants and children from exposure to lead in drinking water" as a key strategy to combat childhood lead poisoning).

[24] *See* David Brown, *Study of D.C. water sharpens understanding of lead threat*, Wash. Post, Dec. 11, 2010, available at http://www.washingtonpost.com/wp-dyn/content/article/2010/12/11/AR2010121102871.html?sid=ST2010122005141.

[25] William L. Roper, et al., Preventing Lead Poisoning in Young Children, ch. 3 (1991), http://www.cdc.gov/nceh/lead/publications/books/plpyc/contents.htm.

has been estimated that 10–20% of the total lead exposure in children can be attributed to a waterborne route, through the consumption of contaminated water."[26] "Exposure to lead via drinking water may be particularly high among very young children who consume baby formula prepared with drinking water that is contaminated by leaching lead pipes."[27]

The most significant source of lead in drinking water is plumbing, particularly in cities with old water systems. "Plumbing that contains lead may be found in public drinking water systems, and in houses, apartment buildings, and public buildings that are more than 20 years old," and even newer systems may contain many components with up to 8 percent lead.[28] Lead-containing service lines, which connect residential plumbing to water mains, are an especially significant source of lead. Such LSLs were commonly used until the mid-1950s,[29]although municipalities may have continued installing them up until 1986 when they were banned. In 1991 EPA estimated that there were at that time "about 10 million lead service lines/connections in the United States and that about 20 percent of all public water systems [had] some lead service lines/connections within their distribution system."[30] EPA's current estimates indicate that there are still roughly 10.3 million full or partial LSLs in the United States.[31] Compounding these problems, "[a]ll water is corrosive to metal plumbing materials to some degree."[32]

In Washington, D.C. for instance, approximately 42,000 children may have been exposed to dangerous levels between 2001 and 2004, during which time "[t]he lead concentrations in the city's water were sometimes hundreds of times higher in individual homes than the amount the

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[26] Letter from CHPAC to EPA, at 8 (Feb. 14, 2013), *available at* http://yosemite.epa.gov/ochp/ochpweb.nsf/content/lead_letter_2013.htm/$File/lead_letter_2013.pdf.

[27] EPA, America's Children and the Environment, 118 (3d ed., 2013), *available at* http://www.epa.gov/opeedweb/children/publications/ACE3_2013.pdf.

[28] ATSDR, Toxicological Profile for Lead, *supra* note 8, at 5; EPA, Lead in Drinking Water.

[29] DC Water and Sewer Authority, Understanding Lead and Water website ("In the U.S., lead service pipes were installed until the mid-1950s. Older properties may still have lead service pipes, which connect the water main in the street to household plumbing.") http://www.dcwater.com/lead/default.cfm (last visited Nov. 06, 2015).

[30] *Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper*, 56 Fed. Reg. 26460, 26466 (June 7, 1991) (hereafter "1991 Lead and Copper Rule" or "1991 LCR"). EPA based its estimate on a survey by the American Water Works Association.

[31] U.S. EPA, Lead Service Line Replacement Primer for Nat'l Drinking Water Advisory Comm. Lead and Copper Rule Working Group (Oct. 22, 2014).

[32] EPA, Consumer Factsheet on Lead in Drinking Water, last updated Mar. 6, 2012, http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/fs_consumer.cfm.

federal government consider[ed] a level of concern."[33] Attempts to repair the lead problem in those homes by replacing only a portion of certain individual LSLs has actually made the problem worse.[34] EPA's 2010 analysis showed that in D.C. homes with LSLs, 26.5% percent of children had blood-lead levels of 5.0 μg/dL or higher and 6% had BLL of 10.0 μg/dL or higher.[35]

The District of Columbia is not alone. During the last decade, studies in numerous cities have revealed high levels of lead in school drinking water, including: Seattle, WA;[36] Durham, NC;[37] Philadelphia, PA;[38] Syracuse, NY;[39] Baltimore, MD;[40] Portland, OR;[41] and San Francisco,

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[33] Carol D. Leonnig, *High Lead Levels Found in D.C. Kids*, Wash. Post, Jan. 27, 2009, available at http://articles.washingtonpost.com/2009-01-27/news/36849769_1_blood-lead-harmful-levels-water-crisis.

[34] *Id.*; *see also* Brown, et al., Association between children's blood lead levels, lead service lines, and water disinfection, Washington, DC, 1998–2006, Environ. Res. (2010), doi:10.1016/j.envres.2010.10.003.

[35] Letter from Mary Jean Brown, Chief, Healthy Homes and Lead Poisoning Prevention Branch, CDC to Lead Poisoning Prevention Program Managers, Important update: Washington, D.C. Blood Lead Level Tests (May 20, 2010), http://www.cdc.gov/nceh/lead/blood_levels.htm. In D.C. homes without a lead service line (but where there was still potential lead exposure inside the home's plumbing), 13.4% had blood-lead levels of 5.0 μg/dL or higher and 2% had BLL of 10.0 μg/dL or higher.

[36] Sanjay Bhatt, *Drinking Water to be Tested at All Seattle Schools*, Seattle Times, Dec. 18, 2003, at B1.

[37] Michael Petrocelli, *School's Drinking Fountains Shut Down: 'Actionable' Lead Amounts Turn up at Y.E. Smith Magnet*, Herald-Sun, Aug. 4, 2004, at C1; see also Catherine Clabby, Expert Faults EPA on Lead: Chemical Change Cited in Durham Water Tests, News & Observer, June 30, 2006,

http://www.newsobserver.com/politics/story/456206.html.

[38] *Pennsylvania: Philly Schools Find Unsafe Lead Levels in 20 Percent of Water Outlets*, eSchool News Online, Dec. 1, 2000, http://www.eschoolnews.com/news/showstory.cfm?ArticleID=2003.

[39] Maureen Nolan, Schools to Get Drinking Faucet Filters: The Project is Intended to Reduce the Levels of Lead in City Schools' Drinking Water, Post-Standard, Aug. 17, 2003, at B3; Government Accountability Office (GAO), Drinking Water: EPA Should Strengthen Ongoing Efforts to Ensure that Consumers are Protected from Lead Contamination 50-53 (2006). Syracuse found almost two dozen schools with high lead levels in the drinking water after performing tests at the request of the EPA, which was concerned about high blood-lead levels among the city's children. D'Vera Cohn, EPA Asks for States' Plans on Lead: Widening Water Problem Spurs Action, Wash. Post, ar. 28, 2004, at C01.

[40] Tanika White, Fountains with Lead Remained in Schools: Plan to Use Bottled Water Was Never Carried Out, Despite Contamination, Baltimore Sun, Feb. 7, 2003 , at 1B.

CA.[42] Most recently, Flint, MI saw a spike in lead levels at residents' taps when the city switched its source of drinking water without taking necessary steps to control corrosion of lead pipes in its water system.[43] Testing revealed elevated levels of lead in the blood of Flint children, and some local schools were forced to turn off their water fountains when sampling revealed lead levels in excess of federal standards.[44] The lead contamination crisis in Flint can be traced in part to an apparent failure to follow water treatment procedures mandated by the current LCR. Nonetheless, it underscores the ongoing threat that lead-contaminated water poses to public health twenty-four years after the LCR was first promulgated, and the need for more stringent enforcement of the human health safeguards under the LCR.

II. Regulatory History

The Safe Drinking Water Act ("SDWA"), 42 U.S.C. 300f *et seq.*, requires EPA to set standards for drinking water quality, including maximum levels for contaminants that may have an adverse effect on the health of persons. SDWA applies to every public water system ("PWS") in the United States. A PWS is defined as "a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals."[45]

EPA published the Lead and Copper Rule in 1991 in response to Congress' 1986 amendments to the SDWA.[46] EPA had originally contemplated setting a maximum contaminant level of zero for lead in drinking source water, but in the final 1991 rule EPA agreed with commenters who "argued that setting [a maximum contaminant level] for levels in source water in addition to the treatment technique requirements for corrosion by-products would result in unnecessary confusion among the public and the regulated community."[47] Instead of setting a maximum contaminant level, EPA adopted a final rule "consisting solely of a treatment technique that seeks to remedy all sources of lead and copper contamination caused by both

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[41] Michelle Cole, *Schools Shut Off Drinking Fountains*, Oregonian, Aug. 25, 2001, at A01.

[42] Nanette Asimov, Toxic Lead Found in Schools: Paint, Drinking Water Tested in S.F. District, San Francisco Chronicle, Nov. 14, 2000, at A21.

[43] Monica Davey, Flint Will Return to Using Detroit's Water After Findings of Lead in Local Supply, New York Times, Oct. 9, 2015, at A16.

[44] *Id.*

[45] 42 U.S.C. § 300f (4)(A).

[46] 1991 Lead and Copper Rule, 56 Fed. Reg. at 26460. Before 1991, under an interim rule published by EPA in 1975, the maximum contaminant level for lead was 0.050 milligrams per liter. *Id.* at 26463.

[47] *Id.*, 56 Fed. Reg. at 26472.

corrosion and contaminated source water."[48] EPA also established a maximum contaminant level *goal* of zero, and stated that "[t]he goal of [the] rule is to provide maximum human health protection by reducing the lead and copper levels at consumers' taps to as close to the [maximum contaminant level goal] as is feasible."[49]

The treatment technique requirements include corrosion control treatment, source water treatment, LSL replacement, and public education. The rule requires each PWS to monitor a specified number of sites depending on the size of the system.[50] Treatment techniques are triggered if samples show an exceedance of the "lead action level" under the rule, which is "exceeded if the level of lead in more than 10 percent of the targeted tap samples is greater than 0.015 mg/L (90th percentile)."[51]

Spurred by the aforementioned reports of lead contamination in the District of Columbia's drinking water, EPA conducted a one-year review of the nationwide implementation of the LCR beginning in 2004.[52] The review identified a number of "targeted changes" to improve the LCR's efficacy in the short term as well as several issues to be addressed over longer-term rulemakings.[53] In 2007 EPA promulgated regulations addressing the short-term revisions to the LCR.[54]

EPA has taken the first steps in crafting regulations to address the more substantial, long-term issues identified in the 2005 report, a process known as the LCR long-term revisions.[55] Before EPA publishes regulations for public comment, the SDWA provides that the agency will consult NDWAC, which is composed of representative from utilities, advocacy groups, and the general public appointed by the EPA Administrator.[56] In anticipation of the LCR long-term revisions, EPA requested that NDWAC establish the LCR Working Group, tasked with

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[48] *Id.*

[49] *Id.*, 56 Fed. Reg. at 26478.

[50] 40 C.F.R. § 141.86(d)(2).

[51] *Id.*; 40 C.F.R. § 141.80(c)(1).

[52] *See* Drinking Water Lead Reduction Plan Fact Sheet, *available* at http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/upload/2009_08_11_lcrmr_pdfs_Drinking_Water_Lead_Reduction_Plan.pdf.

[53] *Id.*

[54] 72 Fed. Reg. at 57782.

[55] Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council ("LCR WG Report") 9.

[56] 42 U.S.C. § 300j-1(a).

analyzing the LCR and developing recommendations to improve the regulations.[57] The Working Group released its Report to NDWAC on August 24th, 2015 after over a year of deliberations, with one member dissenting.[58]

III. The Lead and Copper Rule Working Group Report

The Report recognizes the urgent necessity of revising the LCR, highlighting "questions of disparate impact and environmental justice" in lead contamination of drinking water and noting the need to incorporate advances in scientific knowledge since the current LCR was promulgated.[59] To that end, the Report offers five broad recommendations to improve the LCR's approach to removing lead from drinking water: encouraging the removal of all LSLs, modifying tap water monitoring requirements, improving corrosion control treatment ("CCT"), expanding public education ("PE") programs, and establishing a household action level for lead.[60] Making proactive LSL removal the cornerstone of the LCR's lead remediation program is an important step forward from the current LCR, which mandates LSL removal only when a PWS exceeds the lead action level. Because full LSL removal can take years or decades to complete, minimizing public exposure to lead contamination in the interim is essential. Accordingly the Report's remaining recommendations highlight significant shortcomings and gaps in the current LCR's monitoring, education, and water treatment provisions.

Even as the Report acknowledges the severity of the threat that lead-contaminated drinking water poses to public health, its recommendations fall short of what needs to be done to effectuate the purpose of the LCR—i.e., "to provide maximum human health protection by reducing the lead and copper levels at consumers' taps."[61] Merely *encouraging* PWSs to adopt proactive LSL replacement goals does nothing to ensure accelerated LSL removal absent consequences for failing to meet LSL removal targets. The Report's recommendations regarding PE and the household action level should also be strengthened to ensure that they lead to robust action to protect public health. More troublingly, the proposals to modify the LCR's tap monitoring and CCT provisions would likely *reduce* the efficacy of these essential parts of the rule's treatment technique.

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[57] LCR WG Report at 9.

[58] Yanna Lambrinidou, Statement of Dissent from the Report of the Lead and Copper Rule Working Group to the EPA National Drinking Water Advisory Council ("Dissent").

[59] LCR WG Report at 5.

[60] LCR WG Report at 2-3. The Report also includes recommendations to improve the LCR's program for addressing copper contamination, which are not addressed in this comment.

[61] *Id*., 56 Fed. Reg. at 26478.

A. Proactive Replacement of All Lead Service Lines

The Report states, "[r]emoving the sources of lead in drinking water should be a national goal. More proactive action than has been taken to date is needed to achieve it."[62] Accordingly, the Report calls for the LCR to encourage all PWSs to establish a LSL replacement program "that effectively informs and engages customers to share appropriately in fully removing LSLs."[63] The Report gives a suggested replacement schedule, which begins with a target of 15% of the initial number of LSLs replaced every three-year increment, gradually reduces replacement targets after fifteen years, and concludes with full LSL replacement after thirty years.[64] This proposal departs from the current LCR's policy of requiring LSL replacement only for PWSs that exceed their lead action level[65] and would thus seem to embody a more proactive effort to remove the main source of lead in drinking water.

However, this apparent improvement is undermined by the Report's failure to recommend enforcement measures for the LSL replacement requirements in the revised LCR.[66] The Report recommends that LCR violations would only occur when there are inadequacies in a PWS's customer-outreach efforts, or when a PWS fails "to step up intensity of efforts" if it does not meet its three-year LSL replacement targets.[67] Conspicuously absent is a mechanism for actual enforcement of LSL replacement targets. The LCR must do more than merely *encourage* LSL replacement. The Report appears to suggest that EPA's powers under the SDWA are insufficient to require proactive full LSL replacement,[68] but such a suggestion has no legal basis.[69] Failure by a PWS to reach LSL replacement goals should constitute a violation of the LCR.

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[62] Working Group Report at 13.

[63] *Id.* at 14.

[64] *Id.* at 45.

[65] 40 C.F.R. § 141.84(a).

[66] In contrast, the current LCR institutes a strict schedule of LSL replacement (at least seven percent per year) for PWSs that exceed the lead action level. 40 C.F.R. § 141.84.

[67] LCR WG Report at 19.

[68] *Id.* at 13 ("[removing the sources of lead in drinking water] will require a concerted effort by many, and cannot be accomplished solely through the authorities provided under the Safe Drinking Water Act. . . .").

[69] It is true that the current policy of making PWSs responsible for replacing only those LSLs that they are deemed to own—leaving property owners responsible for the LSLs running under their property—has been a major obstacle to full LSL replacement, but nothing in the SDWA or any other law demands that EPA continue this misguided policy. This issue is discussed in further detail below.

Partial LSL Replacement

The Report notes that the current LCR does not create sufficient incentives to remove and replace the entire length of each LSL—the main source of lead in drinking water—and instead creates a regulatory environment that has encouraged widespread partial LSL replacement.[70] The Report also cites studies showing that partial LSL replacement is ineffective at reducing the amount of lead in drinking water and leads to elevated lead levels in the short term.[71] But the Report does not follow this line of reasoning to its logical conclusion and recommend a prohibition against partial LSL replacement. Instead, it provides a list of "justifiable exceptions" to the general policy of encouraging full LSL replacement, including: "emergency repairs where property owners have refused to participate in a full LSL replacement; during a main replacement project; or when a sufficiently high percentage of property owners participate in an area –wide LSL replacement project to justify replacing LSLs to the property lines of those who do not participate at the time."[72] This list of recommended exceptions is completely at odds with the goals for the LCR long-term revisions, and threatens to undermine the public health-protection purposes of those revisions.

The revised LCR should ban partial LSL replacement. As an initial matter, the Report does not document the need for an "emergency repair" exception that would justify replacing less than one hundred percent of an LSL. Moreover, the above list of exceptions has troubling implications for environmental justice that mirror a major inequity of the current LCR lead-control regime. In many cities, property owners unable to pay to replace the LSLs running under their property were subjected to partial LSL replacement when their PWS replaced utility-owned LSLs up to the property line. Because partial LSL replacement can increase lead levels short term and has been shown to be ineffective at remediating lead contamination long-term, the current LCR's mandatory LSL replacement measures had the perverse result of *increasing* the amount of lead flowing through the taps of many consumers. A person's ability to pay thus became a major determinant of the level of lead contamination in her and her family's water in many places.

In focusing on property owners who have "refused to participate in a full LSL replacement," the Report appears to have missed the point. While there may exist homeowners who refuse to consent to full LSL replacement out of recalcitrance, by far the more pressing obstacle arises from lack of financial resources. Allowing partial LSL replacement to proceed when a "sufficiently high percentage" of customers in an area elect to participate would expose some unfortunate people to the known dangers of partial LSLs, **simply because of their inability to pay**. To its credit, the Report does call for "risk management" measures for

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[70] LCR WG Report at 19.

[71] *Id.*

[72] *Id.* at 14.

customers left with partial LSLs, such as providing filters and plastic piping,[73] but such stopgap measures are no substitute for full LSL removal.

Service line ownership

The current approach to questions concerning the ownership and control of LCRs is directly tied to an increased likelihood of partial LSL replacement. Service lines include portions owned by utilities as well as portions deemed to be owned by individual customers. Under the current LCR, a PWS is responsible for replacing only the portion of an LSL that it owns; for any remaining portion that is deemed to be privately-owned, the PWS is only required to offer to replace that portion of the LSL at the customer's expense.[74] The LCR's apportionment of shared responsibility for LSL replacement between utility and customer is a major reason for the prevalence of partial LSL replacement, as customers are often unable to shoulder the expense of replacing their portion of a service line, which is typically estimated to range from $1,000 to $7,000.[75] Additionally, PE materials provided by PWSs may fail to adequately inform customers of the public health purpose of LSL replacement, the nature of utility and homeowner rights and responsibilities regarding service lines, and the comparative benefits and risks of full LSL replacement and partial LSL replacement.[76]

The Report states that the Working Group discussed but did not reach a consensus on the question of whether the LCR should make PWSs responsible for replacing LSLs under their "control," which could encompass LSLs deemed to be owned by customers where the PWS has the authority to repair, replace, or maintain the LSL.[77] A control-based approach would support full LSL replacement. In contrast, the Report's continued emphasis on having customers "share appropriately" in LSL replacement threatens to perpetuate the existing inequities of the LCR's shared responsibility system. Over twenty years of history have shown that when property owners are asked to pay for full LSL replacements, the vast majority decline to do so, many for no reason other than inability to pay. In Washington, D.C. for example, through the duration of the city's service line replacement program from 2003 to 2008, only 15% of property owners

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[73] *Id.*

[74] 40 C.F.R. § 141.84(d).

[75] *See* Yanna Lambrinidou and Marc Edwards, Improving Public Policy through Qualitative Research: Lessons from Homeowners about Lead Service Line Replacement under the Federal Lead and Copper Rule (presentation at 141st APHA Annual Meeting and Expo, Nov. 2-6, 2013, Boston, MA).

[76] *Id.*

[77] LCR WG Report at 18.

elected to have a full replacement—2,128 out of 14,260 service lines that were ultimately replaced.[78]

Among other failings, use of the "ownership" test presumes that (1) the property owner is knowingly assuming the risk of leaving private-owned LSLs in place, (2) the property owner is in fact the one who will be exposed to this risk, and (3) that everyone has the ability to pay for LSL replacement if they deem the risk significant. None of these assumptions is true. First, unless and until public education efforts are significantly ramped up and have had sufficient time to penetrate the public consciousness, property owners will be largely unaware of the risks they are assuming when choosing partial LSL replacement. Second, those renting their homes will likely have no say in the matter at all. Home ownership rates, which are low in general among the nation's poorest families,[79] are disproportionately low for African Americans and certain other racial/ethnic groups, as well.[80] Lastly, and most importantly, a property owner's ability to pay should not affect her risk of lead exposure. The "ownership" test prejudices poor families and families of color, and hurts families who are not adequately informed of the risks of lead exposure.

The Report attempts to resolve this last failing by suggesting research into "creative financing possibilities," such as a possible IRS tax refund to families who choose full LSL replacement, but none of its suggestions are adequately explained and none address the other failings of the "ownership" test. The problem is that by dividing responsibility, the "ownership" test requires complicated solutions. Some entity has to come up with funding, which it can give to the property owner, who can then pay the PWS. Control is much simpler to establish, greatly reduces the number of actors and decision-makers involved, and avoids the need for complex financing solutions to mitigate environmental justice concerns

The Report points to state prohibitions on spending public funds on private property and the difficulty of gaining physical access to private property as major obstacles to a control-based LSL replacement scheme,[81] but these are more easily surmounted than the difficulties of

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[78] The District of Columbia and Communities Nationwide Face Serious Challenges in Their Efforts to Safeguard Water Supplies, GAO-08-687T at 6-8 (April 15, 2008); *see also* GAO-05-344, *Agencies Have Improved Coordination, but Key Challenges Remain in Protecting the Public from Elevated Lead Levels*, Report to the Chairman, Subcommittee on Environment and Hazardous Materials, Committee on Energy and Commerce, House of Representatives (March 2005), p. 4 (raising the same concerns as in 2005).

[79] http://www.huduser.gov/Publications/pdf/HomeownershipGapsAmongLow-IncomeAndMinority.pdf at 91

[80] http://www.huduser.gov/Publications/pdf/HomeownershipGapsAmongLow-IncomeAndMinority.pdf at 85

[81] LCR WG Report at 18.

implementing the current ownership-based system. The public benefit doctrine found in many state constitutions poses no barrier to an LSL replacement program that clearly aims to promote public health. The application of this doctrine may vary from one state to another, but in general a public purpose "has for its objective the promotion of public health, safety, morals, security, prosperity, contentment, and the general welfare of the community."[82] The term "public purpose" is broad and should not be construed "in a narrow or restrictive sense."[83] A public purpose may be served even if it involves making payments to individuals.[84] Additionally, property rights can be respected by requiring the PWS to obtain a "right of entry" from property owners—a choice that will not depend on owners' ability to pay. Lastly, funding for replacement projects can be obtained in numerous ways, with the unifying characteristic that only one party, the PWS, needs to be involved in the transaction.

Nor does the history of litigation over the 1991 LCR justify retaining the ownership approach. In response to a challenge by the American Water Works Association, the D.C. Circuit struck down EPA's definition of "control" in the final 1991 rule, solely on the grounds that "EPA failed to provide adequate notice that it would adopt a novel definition of control."[85]

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[82] Slawson v. Alabama Forestry Comm'n, 631 So.2d 953, 956 (Ala. 1994); Clifford v. City of Cheyenne, 487 P.2d 1325, 1329 (Wyo. 1971); Platte Valley Public Power & Irrigation Dist. v. Lincoln County, 14 N.W.2d 202, 205 (Neb. 1944); State ex rel. McClure v. Hagerman, 98 N.E.2d 835, 838 (Ohio 1951); Greensboro-High Point Airport Authority v. Johnson, 226 N.C. 1, 15 (N.C. 1946); State ex rel. Warren v. Nusbaum, 59 Wis.2d 391, 423 (Wis. 1973); City of Pipestone v. Madsen, 287 Minn. 357, 366 (Minn. 1970).

[83] Burkhardt v. City of Enid, 771 P.2d 608, 610 (Okla. 1989); Madison Cablevision, Inc. v. City of Morganton, 325 N.C. 634, 646 (N.C. 1989); Dannheiser v. City of Henderson, 4 S.W.3d 542, 546 (Ky. 1999) (and cases cited therein).

[84] See Ullrich v. Bd. of Cnty. Comm'rs of Thomas Cnty., 234 Kan. 782, 788-89 (Kan. 1984) ("The generally recognized rule is that a state legislature may appropriate public money or property for private individuals, if thereby the public welfare is promoted."); see also Mountain Water Co. v. Montana Dept. of Public Service Regulation, 919 F.2d 593, 601 (9th Cir. 1990) (upholding a requirement applicable to privately-owned water utilities "to help assure service line maintenance [and] redistribute the cost of service line maintenance among all customers.").

[85] *Am. Water Works Ass'n v. E.P.A.*, 40 F.3d 1266, 1275 (D.C. Cir. 1994). The D.C. Circuit viewed EPA's definition of "control" as novel because "public water systems generally *own* only that part of the service line that underlies public property." *Id*. at 1274. (emphasis added). However, the proposed rule had clearly rebuttable presumption "that the water supplier owns *or controls* and therefore can replace, *the lead components up to the wall of the building served*." Drinking Water Regulations; Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, 53 Fed. Reg. 31516, 318548 (Aug. 18, 1988). The court also reasoned that the only case to have interpreted the definition of "public water system" was a 1988 ruling of the Georgia Supreme Court interpreting the Georgia Safe Drinking Water Act,

Any questions regarding the scope or meaning of "control" could be addressed in a new rulemaking that provides ample public notice to affected PWSs. To the extent there is any merit to the American Water Works Association's substantive allegations against the 1991 control rule – that EPA lacked authority to adopt a control-based rule, and that the definition was impermissibly vague because EPA did not indicate whether the rule created a right of entry on private property – EPA can address those issues in a new rulemaking.

LSL inventory

An additional defect in the Report's LSL replacement proposal is its LSL accounting scheme. The Report has two related recommendations for improving PWSs knowledge of LSLs within their system:

1) A "presumption that a service line put in place prior to the date when lead service lines were prohibited has leaded materials unless the PWS has information to confirm that it [does] not."
2) "Providing credit to a PWS toward its replacement goals for demonstrating that a service line presumed to include lead does not have leaded materials."

This second suggestion serves only to undermine the stated purpose of the LSL replacement program and could lead to significant delays in implementing full LSL replacement. Giving "credit" for existing service lines that do not contain lead would allow a PWS to replace *fewer* LSLs than it would otherwise have to in a given year, a result squarely contrary to the goal of rapid LSL replacement. It would also create a perverse incentive for PWSs to characterize as lead-free service lines that are of uncertain or ambiguous composition. Because this recommendation has no apparent public health justification, EPA should reject it and instead focus on different ways to require or incentivize accelerated LSL inventories by all PWSs.

B. Monitoring

If implemented, the Report's recommendations regarding lead monitoring would likely result in a weaker monitoring regime than the current LCR's. PWSs are currently required to

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which was identical to the definition of a PWS under the SDWA, as "confining the regulatory authority to portions of the service line *not underlying private property*." *Am. Water Works Ass'n* at 1275, citing *Bass v. Ledbetter,* 257 Ga. 738, 363 (Ga. 1988) (emphasis added). But EPA's proposal clearly went beyond the Georgia court's interpretation by presuming that "lead components up to the wall of the building served" could be within a PWS's "control." Nonetheless, because EPA had given "control" a specific definition that was not articulated in the proposed rule, and had deviated from the Georgia court's interpretation of "PWS" under the state's law, the D.C. Circuit concluded that interested parties could not "reasonably have anticipated the final rulemaking." *Am. Water Works* at 1275.

measure levels of lead in their water through periodic monitoring, which includes targeted tap water sampling,[86] source water monitoring,[87] and monitoring of Water Quality Parameters ("WQPs") at various points in the system.[88] Data collected on WQPs, including , alkalinity, conductivity, temperature, and calcium, is used to assess the corrosivity of the water supply.[89] Data obtained from sampling at individual drinking water taps is used to ascertain whether a PWS exceeds the LCR's Lead Action Level, which triggers mandatory response measures such as LSL replacement.[90] The Report finds fault in the current monitoring regime, citing "numerous challenges" and focusing in particular on "difficult and costly" in-home tap water sampling.[91] The Report recommends replacing the LCR's monitoring program with the following 2-part program: "1) a more robust WQP monitoring program to improve process controls for CCT, and 2) voluntary customer initiated sampling. . . to provide direct information to consumers that they can use to reduce potential exposures to lead from drinking water. . . and to provide ongoing information to the PWS to identify and correct unanticipated problems. "[92] The Report also calls for increased customer outreach to encourage voluntary tap sampling, including a "menu" of sampling protocols for customers to choose from.[93]

This proposal is deeply misguided. As noted above, WQP monitoring was instituted under the 1991 Lead and Copper Rule as a means for assessing the corrosivity of water. The Report offers no evidence that WQPs provide a reliable indicator of lead levels at consumers' taps.[94] Surrogate measuring should only be used when direct measuring of a contaminant is prohibitively costly or otherwise impossible *and* where the surrogate measure provides the most reliable indirect measure of the presence of the targeted contaminant. This is not the case with lead, which can be readily measured in tap samples and for which WQPs cannot not provide a reliable surrogate measure. The Report fails to justify deemphasizing targeted tap sampling in favor of a method known to be a less reliable indicator of lead levels. Simply put, the most reliable way to ascertain lead levels at consumers' taps is to measure lead levels at

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[86] 40 C.F.R. § 141.86.

[87] 40 C.F.R. § 141.88.

[88] 40 C.F.R. § 141.87.

[89] 1991 Lead and Copper Rule, 56 Fed. Reg. at 26466.

[90] 40 C.F.R. § 141.84(a).

[91] LCR WG Report at 30, 32.

[92] *Id.* The Report notes, "[i]t seems appropriate to include some sort of floor to the number of customer samples. Some members of the [Working Group] suggested that systems should be required to collect no fewer samples in a three year period than they would under the current three-year reduced monitoring requirement." *Id.* at 34.

[93] *Id.*

[94] Dissent at 13.

consumers' taps. Eliminating mandatory, targeted tap water sampling and replacing it with voluntary, consumer-driven sampling would further undermine the goal of effectively monitoring lead levels. Because volunteer sampling assumes that consumers will have a sufficient understanding of the need for sampling, it is more likely to produce data from households that enjoy higher socio-economic status, education level, and English language skills. For that and other reasons, volunteer sampling according to consumer-chosen protocols would yield only sporadic data that would be of little use in ascertaining system-wide lead levels.

Effective tap water monitoring demands a systematic, targeted approach. Lead levels can vary greatly depending on location within a water system and over time,[95] so even tap sample data indicating low lead levels at a large number locations throughout a PWS can belie a situation in which some customers are being exposed to unacceptably high levels of lead. Accordingly, tap sampling should target the homes at highest risk of lead contamination, as mandated in the current LCR.[96]

There is ample room for improvement to the current LCR's tap water monitoring regime, but any changes should make tap monitoring more effective, not less so. For example, the current LCR mandates that nearly all tap samples be "first-draw" samples,[97] a technique that is now known to significantly underestimate actual lead levels.[98] Sampling protocols should be revised to reflect up-do-date scientific knowledge, including a ban on practices such as "pre-flushing" that are known to underestimate lead levels. Additionally, the LCR should mandate that uniform protocols be used throughout the system to ensure a consistent, useful pool of data on lead levels.

Sample invalidation

Under the current LCR a PWS can request that its state invalidate tap water samples for a limited number of reasons, such as damage to the sample container or error in laboratory analysis.[99] The Report asserts that this closed list of sample invalidation criteria leads to instances in which "samples that are obvious 'outliers' and don't represent the water that is normally consumed and should not be used as a basis for treatment changes or public education" must be accepted.[100] The Working Group urges EPA to "expand the invalidation

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[95] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26514.

[96] 40 C.F.R. § 141.86(a).

[97] 40 C.F.R. § 141.86(b).

[98] Dissent at 14.

[99] 40 C.F.R. § 141.86(f).

[100] LCR WG Report at 34.

criteria" to reflect this concern.[101] This proposal would create an unnecessary and potentially disastrous loophole. The current list of sample invalidation criteria focuses on errors in sample collection, without taking into account the testing results of a given sample. Expanding sample invalidation criteria to allow the exclusion of "outliers" could allow PWSs to disregard valid samples simply because their results show high lead levels. Such a policy would undercut the very rationale for having a sampling program, and it could become a means for a PWS to create the appearance of low overall lead levels while failing to address lead contamination in homes within the system. Under no circumstances should a PWS be allowed to invalidate an otherwise valid sample after seeing the testing results.

C. Corrosion Control Treatment

CCT is the most important aspect of the LCR's lead control treatment technique because it can dramatically reduce the amount of lead that leaches from lead pipes into drinking water if properly implemented. The current LCR CCT regime contains several flaws that prevent it from realizing this potential. Unfortunately, rather than addressing these flaws head-on, the Report's CCT proposals would likely result in a *weaker* CCT regime than the current LCR.

The goal of CCT is to minimize corrosion of lead-containing pipes, thus reducing the amount of lead leaching from those pipes into water destined for human consumption. Each PWS varies in factors such as size, source water, and age of the physical infrastructure, and each of these affects pipe corrosions. Accordingly, CCT needs to be calibrated to fit local circumstances. The LCR currently requires all large PWSs to develop optimal CCT, defined as CCT "that minimizes the lead and copper concentration at users' taps while insuring that the treatment does not cause the water system to violate any national primary drinking water regulations."[102] Small and mid-size PWSs are required to develop optimal CCT if they are unable stay below the action level for lead.[103] The LCR also requires that PWSs periodically assess their CCT through monitoring of WQPs, and PWSs able to maintain WQPs within established ranges are deemed to have effective CCT.[104]

This CCT regime has been marred by failures of implementation and flaws of design. To implement optimal CCT, the current LCR directs all large PWSs to conduct extensive studies and develop optimal CCT in cooperation with their respective states; the 1991 regulations provide a schedule of seven steps over six years (1993-1998) for them to complete this task.[105] Despite these clear instructions, few large PWSs conducted the studies necessary to develop

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[101] *Id.*

[102] 40 C.F.R. § 141.2.

[103] 40 C.F.R. § 141.82(a)(2).

[104] 40 C.F.R. § 141.82(g).

[105] 40 C.F.R. § 141.82(d).

optimal CCT.[106] Instead, most large PWSs have implemented ad hoc CCT with the goal of staying below the lead action level (15 parts per billion).[107] In effect, these PWSs have been held to a less stringent standard for CCT than the standard called for in the LCR's CCT optimization provisions, which demand that PWSs achieve *minimization* of lead levels. Regarding the current CCT assessment provisions, the LCR Working Group dissenter and others have pointed out that WQP monitoring is an imperfect indicator of actual lead levels. Indeed, only 172 PWSs have failed to maintain WQPs within established ranges since 1991, yet over 6,000 PWSs have exceeded the lead action level in that time.[108] In other words, that a PWS is able to maintain acceptable WQPs does not guarantee CCT achieving low lead levels at the tap.

The Report takes up both CCT optimization and CCT assessment. Noting that optimal CCT depends upon up-to-date science and attention to local conditions,[109] the report recommends that EPA develop a new CCT guidance manual "as soon as possible" and update the manual every six years; it also suggests that large PWSs be required to review their CCT plans in light of the updated manual and be required to do so in every six year rule review cycle.[110] To improve CCT assessment, the Report recommends that CCT be evaluated according to the "regular stream of data" from voluntary customer tap water sampling under the monitoring regime described above.[111] All customer sampling data would be compiled and reported to the state; if the most recent three years of customer sampling data shows the 90th percentile to be above the action level for lead, the PWS would be required to determine if "analysis, re-evaluation of CCT, or other actions. . . are appropriate."[112]

These recommendations do not adequately address the shortcomings of the current CCT regime, and linking assessment to voluntary customer tap sampling would further reduce CCT's efficacy. As noted above, switching from targeted tap sampling to voluntary, customer-initiated sampling would result in a much weaker pool of data about lead levels within a water system. Coupling CCT assessment to less accurate information about lead levels within a PWS can only weaken CCT. The Report's recommendations regarding CCT optimization would be a step in the right direction, but they do not go far enough in addressing the history of large PWSs failing to comply with the LCR's explicit directives on CCT optimization.

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[106] Dissent at 14.

[107] *Id.*

[108] *Id*. at 13.

[109] LCR WG Report at 29.

[110] *Id.* at 30.

[111] *Id*. at 33.

[112] *Id.* Although three years of sampling data would be used to calculate the 90th percentile, PWSs could be required to report sampling data annually "at the discretion of the primacy agency."

CCT is a science-based treatment technique that requires accurate information on actual lead levels, continual monitoring, and attention to the individual circumstances of each PWS. Although the precise contents of an effective CCT regime are beyond the scope of this comment, the dissenting Working Group member suggests that it will require at minimum: (1) robust monitoring of lead levels in water; (2) true CCT optimization in large PWSs, i.e. CCT that minimizes lead corrosion without violating other national water quality standards; (3) mandatory corrective action by a PWS if the lead action level is exceeded; and (4) a compliance mechanism that links CCT to lead levels at the tap.[113]

D. Household Action Level

The Report's proposal to establish a household action level for lead addresses an important gap in the LCR, but it needs to be bolstered if it is to adequately fill that gap. The current LCR calculates the lead action level with reference to the 90th percentile of all tap water samples in a system. Accordingly, samples from individual dwellings can contain high levels of lead without triggering the lead action level for the PWS as a whole. The Report calls for the creation of a "household action level" to address this problem: if a tap sample exceeds the household action level, the PWS would be required to notify local health departments and the state drinking water authority.[114] This proposal addresses an important gap in the current LCR, but in its current form its efficacy is limited. The proposed household action level does not mandate any action by health departments upon notification of an exceedance of the household action level, nor can it, as the SDWA does not give EPA authority to regulate local health departments. The Report acknowledges as much, incongruously stating, "while the LCR cannot guarantee actions by health departments, this recommendation provides direct health intervention in those cases where sampling indicates high lead levels.[115] Instead of merely providing that PWSs notify local health authorities of exceedances of the household action level, the LCR should require PWSs to take immediate remedial action in the affected homes and to ensure that the affected residents have adequate health safeguards until the danger is eliminated.

E. Public Education

Public Education ("PE") is an essential part of the LCR. The public remains under-informed of the dangers of lead contamination of drinking water, and of the "shared responsibility" the LCR expects them to take to protect themselves and their families. The

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[113] Dissent at 15.

[114] LCR WG Report at 36. The Working Group recommends that the household action level be set with reference to the amount of lead it would take to induce an average, healthy infant drinking formula to have blood lead levels of greater than five micrograms per deciliter. *Id.* at 37.

[115] *Id.* at 32-33.

Report calls for greater efforts to disseminate information about the risks of lead contamination in drinking water through PE materials. Specifically, it recommends establishing a "national clearinghouse" of PE materials for use by PWSs; requiring PWSs to send PE materials to all new customers; revising the language of Consumer Confidence Reports ("CCRs"); requiring PWSs to make publicly available information about LSLs and other information related to lead contamination; and expanding outreach to health care providers serving populations vulnerable to lead poisoning.[116] These proposals would do much to improve PE regarding lead contamination of drinking water, and several suggestions to further improve this facet of the LCR are included below.

However, both the current LCR and the Report leave unaddressed two of the most serious contributors to spikes in lead contamination of drinking water: physical disturbance of lead-containing pipes and period of disuse of lead-containing pipes. These pressing problems are described in further detail below.

Revisions to CCR language

SDWA regulations require PWSs to deliver annual CCRs to customers for any contaminants detected in their water.[117] The Report includes suggested revisions to the language of the CCR for lead to reflect up-to-date science, notify customers of resources available in the national clearinghouse, and emphasize that "customers play an important role in protecting themselves from exposure to lead."[118] As a "starting point," it recommends adding the following language:

> Your water utility is required to minimize the corrosivity of the water. However, because every home is different, the amount of lead in your tap water may be lower or higher than the monitoring results for your public water system as a whole. You can take responsibility for identifying and removing lead materials within your home plumbing and taking steps to reduce your family's risk. If you have lead service lines or lead-bearing materials in your home, [you may wish to have your water tested.][119]

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[116] LCR WG Report at 21-22.

[117] 40 C.F.R. § 141.151(a). The current CCR language for lead can be found at 40 CFR § 141 Appendix A to Subpart O.

[118] LCR WG Report 24.

[119] *Id*. Bracketed portion is language from the current CCR.

Improving the efficacy of CCR is an important goal, but the Report's emphasis on CCR ignores the documented inadequacies of that medium as an educational vehicle.[120] Furthermore, this suggested language does not do enough to inform water consumers of the role the LCR regime expects them to play in protecting themselves from preventable exposures to lead contamination.

Transparency

The Report recommends that the LCR require PWSs to make available to the public information regarding: 1) "the number of samples over the Household Action Level, median, 90th percentile, and highest level found in the last monitoring period" and 2) "CCT treatment, approved WQP ranges and WQP results from the last monitoring period."[121] It also recommends that EPA "encourag[e]" PWSs to provide information on PE materials, sampling protocols, individual sampling results, and inventory/maps of LSLs.[122] These proposals to increase the amount of information available to consumers would be strengthened by *requiring* that PWSs provide the information that the Working Group recommends EPA only *encourage* PWSs to provide.

IV. Issues not Addressed in the LCR Working Group Report

Beyond the discrete issues identified above, the Report omits or gives insufficient attention to two important aspects of the problem of lead contamination of drinking water that must be addressed in the LCR long-term revisions: exposure factors now known to cause spikes in lead levels at drinking water taps, and the persistence of disparities in exposure to lead-contaminated water based on income, race, and ethnicity.

Physical Disturbances and Scale Deterioration

Scientific knowledge of the problem of lead contamination has advanced in the twenty-four years since the LCR was first promulgated. We now know that two of the most significant factors contributing to elevated lead levels in drinking water are physical disturbance of lead-containing pipes and deterioration of protective scales coating the interior of such pipes during prolonged disuse. While the Report mentions both issues in passing, it does not recommend robust actions to address these factors through revisions to the LCR. The gravity of the risk to public health from these two exposure factors warrants greater attention

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[120] Dissent at 8 (citing studies that document or otherwise bear on the inadequacy of CCR alone as a medium for communicating health risks. Among other reasons, CCR is not sufficiently urgent, repetitive, or targeted to those most at-risk).

[121] LCR WG Report at 28.

[122] *Id.* at 25.

Studies by EPA scientists have shown that physical disturbances in particular can cause acute spikes in lead levels, temporarily exposing consumers to dangerously high amounts of lead in their water even in areas deemed safe by current monitoring practices.[123] Any activity that physically disrupts an area in proximity to service lines can cause a physical disturbance, from PWS maintenance to roadwork to private construction. The difficulty inherent in addressing this issue is compounded by the fact that not only PWSs, but a variety of public and private actors outside the direct regulatory reach of the SDWA and LCR undertake activities that lead to such disturbances. To its credit, the Report recommends requiring PWSs to inform other utilities whose work might affect LSLs about how to both manage potential disturbances and communicate with residents of affected homes about risks and risk mitigation measures.[124] This is an important first step in addressing one of the most important contributors to lead contamination of drinking water, but much more needs to be done. We urge EPA to begin immediately exploring mandatory preventative and remedial measures to address physical disturbance in the LCR revisions, including expedited full LSL removal.

Similarly, advances in scientific understanding since 1991 have revealed that effective CCT requires regular flows of treated water to create and maintain the scale that forms a protective barrier between lead pipes and water destined for human consumption.[125] Periods of disuse, such as when a residence is unoccupied, can lead to deterioration of that protective scale. When use resumes, such as when new occupants move in, particles of the scale itself can break off and enter the water. Not only does this leave pipes with gaps in the protective barrier, it creates an acute risk of lead contamination because particles of the deteriorated scale may contain extremely high amounts of lead. This factor is of particular concern from an environmental justice perspective because, among other reasons, foreclosure-related vacancies are concentrated in neighborhoods with large Hispanic and Black populations.[126] The Report does not address this known risk.

As noted in the PE section above, it is imperative that consumers be informed of the dangers posed by physical disturbances and scale deterioration as well as steps they can take to protect themselves and their families. However, PE alone is not sufficient to address the danger posed by these two issues, which also highlight the necessity of removing all LSLs from water systems as quickly as possible, before an event triggers a sudden release of lead into drinking water. In the interim, EPA must take further action to address the threat posed by these issues

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[123] Del Toral, M. A. et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *ES&T* 47(16): 9300–9307.

[124] LCR WG Report at 18.

[125] Arnold, R., and M. Edwards. 2012. Electrochemical Reversal of Galvanic Pb:Cu Pipe Corrosion. *ES&T*46(20):10941-7.

[126] Matthew Hall, et al., Neighborhood Foreclosures, Racial/Ethnic Transitions, and Residential Segregation (2015), *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4479290/.

until all LSLs are removed from the nation's water systems, whether in through the revised LCR or some other regulatory mechanism. We therefore also urge EPA to explore mandatory preventative and remedial measures in the LCR revisions to address the particular risks to new occupants of long-vacant homes.

Environmental Justice

Gross disparities in the impact of lead-contaminated water along lines of income, race, and ethnicity persist nearly two and a half decades after the promulgation of the LCR. EPA acknowledged this when it made addressing environmental justice concerns an explicit goal of the LCR long-term revisions.[127] While the Report mentions "important questions of disparate impact and environmental justice," it fails to confront these questions in a manner commensurate to their gravity. In several instances its recommendations would even exacerbate these inequities. As noted above, the well-known consequences of partial LSL replacement fall heavily on those who cannot afford to pay to replace LSLs running under their property. More broadly, because lead contamination affects low-income, black, and Hispanic populations disproportionately, any weakening of LCR's treatment technique or failure to institute an effective LSL replacement program will be felt more acutely by these populations as well.

The "shared responsibility nature of the LCR"[128] is not an excuse to leave vulnerable individuals and communities to fend for themselves in the face of a weakened treatment technique and an aspirational LSL replacement regime with no mechanism for ensuring removal of all dangerous LSLs. The stakes are too high in light of the lifelong consequences of lead poisoning, especially for the young. The revised LCR must address the socioeconomic and racial inequities in lead contamination of water head-on.

CONCLUSION

The LCR Working Group Report contains many good and important suggestions to improve the LCR. It has significant shortcomings and omissions as well. A strength of the LCR long-term revisions process is the opportunity for due deliberation, and EPA should not accept the Report's recommendations without critical examination. As EPA considers the Report and NDWAC's recommendations and proceeds with revising the LCR, we urge that it keep the public health-protective purpose of the SDWA and the interests of environmental justice as the core driving factors in the LCR long-term revision process.

Sincerely,

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[127] EPA, LCR Long-term Revisions White Paper, available at:

http://water.epa.gov/drink/ndwac/upload/lcrwgmeetsumaxd32514.pdf (last visited 11/06/15).

[128] LCR WG Report at 19.

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RE: Comments on the Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council

Dear Mr. Grevatt and Members of the National Drinking Water Advisory Council:

Please accept the following comments on the Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council.

INTRODUCTION

The recent public health crisis in Flint, Michigan is only the latest example of the ongoing danger of lead contamination in the nation's drinking water. The upcoming revisions to the Lead and Copper Rule ("LCR") represent an opportunity for EPA to make essential improvements to the most important regulatory mechanisms for removing lead from the drinking water consumed by millions of people in the United States.

The Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council ("the Report") contains many important suggestions for improvement to the LCR. EPA should take special note of the Report's reassessment of the LCR based on the growing body of scientific knowledge about lead contamination of drinking water as well as documented problems with the LCR's implementation since the rule was first promulgated in 1991. In particular, the Report highlights the importance of replacing *all* known lead service lines ("LSLs") in light of the fact that there is no safe level of lead exposure, and the fact that the risk of contamination is present whenever water makes contact with lead plumbing. The Report's proposals to establish a household action level for lead and to strengthen the LCR's public education provisions would also represent important improvements to the rule.

However, the revised LCR will require significant modifications and additions beyond those proposals put forth in the Report if it is to be sufficiently protective of public health. Provisions for ensuring proactive replacement of all LSLs must be accompanied by robust accountability mechanisms to ensure that public water systems ("PWSs") fulfill their replacement obligations. The household action level and public education proposals will likewise need to be bolstered to ensure their efficacy. Furthermore, if implemented, the Report's proposals regarding customer tap sampling, corrosion control treatment, and LSL inventory would likely *diminish* the efficacy of current LCR provisions in these areas. EPA must reject these regressive proposals in order to avoid backsliding in the LCR.

The Report also omits or gives insufficient attention to some of the most important contributors to lead contamination of drinking water currently unaccounted for in the LCR: physical disturbance of lead-containing pipes and periods of disuse of such pipes when a residence is unoccupied. Both of these can lead to dangerous spikes in lead levels at the tap. Additionally, the Report fails to address one of the greatest obstacles to effective, equitable implementation of the current LCR: its "shared responsibility" approach that holds household residents largely responsible for protecting themselves from lead-contaminated drinking water, regardless of their ability to bear the significant costs of doing so. As discussed in further detail below, the current approach to this shared responsibility regime has contributed to widespread instances of partial LSL replacement, in many cases due to the residents' inability to pay for full LSL replacement—a practice that can actually increase lead levels in drinking water. For this and other reasons, the impact of lead-contaminated water is distributed disproportionately along lines of class, race, and ethnicity. The revised LCR must do more to ensure that lead-free water is available to everyone served by a PWS.

The Report is the culmination of months of hard work by the LCR Working Group, and EPA should pay close attention to the important suggestions to improve the LCR it contains. However, as EPA carries out the LCR long-term revisions process it should be aware that the LCR revisions will need to go well beyond the recommendations in the Report if they are to achieve their public health-protection objectives. The dangers of lead contamination are too great to allow for anything less.

I. Background on Lead

Lead is a dangerous neurotoxin that persists in the environment and bioaccumulates when taken into the human body. Scientific consensus shows that there is no safe level of lead exposure.[1] EPA and the Center for Disease Control ("CDC") have recognized this.[2]

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[1] *See* EPA, Basic Information about Lead in Drinking Water, last updated Mar. 6, 2012, http://water.epa.gov/drink/contaminants/basicinformation/lead.cfm ("[T]he best available science . . . shows there is no safe level of exposure to lead.").

In children, lead exposure is known to cause "[p]ermanent damage to the brain and nervous system, leading to behavior and learning problems, lower IQ, and hearing problems," slowed growth, anemia, and, "[i]n rare cases . . . seizures, coma and even death."[3] Lead is especially dangerous for children because it acts on their developing brains and nerves.[4] Lead exposure has been linked to neurological and behavioral problems, including attention-deficit/hyperactivity disorder, criminal behavior, and a need for special education.[5] There is substantial evidence that lead exposure negatively impacts children's IQ and academic performance.[6] For adults, lead exposure can cause nervous system effects, cardiovascular effects, increased blood pressure, decreased kidney function, and reproductive problems for adults of both sexes.[7] Further, lead can accumulate for decades in a person's bones.[8] Certain circumstances—including pregnancy, breaking a bone, and old age—cause accumulated lead to be released back into the bloodstream and the organs where it can cause damage years after initial exposure.[9]

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[2] *See*, *e.g.*, CDC, What do Parents Need to Know to Protect Their Children (2012), available at http://www.cdc.gov/nceh/lead/ACCLPP/blood_lead_levels.htm ("'The most important step parents, doctors, and others can take is to **prevent lead exposure before it occurs**.'"); CDC, Lead in Drinking Water and Human Blood Lead Levels in the United States (2012), available at http://www.cdc.gov/mmwr/preview/mmwrhtml/su6104a1.htm?s_cid=su6104a1_w ("Because lead accumulates in the body, all sources of lead should be controlled or eliminated to prevent childhood lead poisoning.").

[3] EPA, Learn About Lead, last updated Apr. 1, 2013, http://www2.epa.gov/lead/learn-about-lead.

[4] National Library of Medicine, MedlinePlus: Lead poisoning, last updated Feb. 1, 2013, http://www.nlm.nih.gov/medlineplus/ency/article/002473.htm

[5] CDC, CDC's Healthy Homes/Lead Poisoning Prevention Program, 2 (2012), *available at* http://www.cdc.gov/nceh/information/program_factsheets/lead_program_overview.pdf

[6] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, ix (2012), *available at* http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[7] EPA, Learn About Lead, last updated Apr. 1, 2013, http://www2.epa.gov/lead/learn-about-lead. *See also* California DTSC, Requirements for Low Lead Plumbing Products in California, (2011), *available at* http://www.dtsc.ca.gov/PollutionPrevention/upload/Lead-in-Plumbing-Fact-Sheet.pdf ("For adults, high levels of exposure to lead in drinking water can result in kidney problems, high blood pressure, nerve disorders, fertility problems, muscle and joint pain, irritability, memory and concentration problems.").

[8] ATSDR, Toxicological Profile for Lead, 7–8 (2007), *available at* http://www.atsdr.cdc.gov/toxprofiles/tp13.pdf.

[9] *Id.*

Children in the United States continue to show high levels of lead in their blood.[10] "Childhood blood lead levels in the United States differ across groups in the population, such as those defined by socioeconomic status and race/ethnicity."[11] Blood-lead levels ("BLLs") tend to be higher for children living in older housing, and children who suffer nutritional deficiencies.[12] There are also significant disparities in the way that lead contamination affects different racial and ethnic groups: "About 22% of African American children and 13% of Mexican American children living in pre-1946 housing are lead poisoned, compared with 6% of white children living in comparable types of housing."[13] The National Black Environmental Justice Network notes that "Black children are five times more likely than white children to have lead poisoning [and] 1 in 7 black children living in older housing has elevated blood lead levels."[14] The CDC has noted that, based on data from the 1999-2002 and 2007-2010 National Health and Nutrition Examination Survey, "disparities in the [geometric mean] BLL by factors such as race/ethnicity and income level, which have been important historically, persist."[15]

Additionally, because lead is absorbed into children's bones and accumulates, disparate exposure from others sources compound the dangers of lead for children in certain vulnerable communities.[16] For example, "[c]hildren living in poverty and Black non-Hispanic children tend to have higher blood lead levels and higher levels of lead-contaminated dust in the home than do other children," making them especially vulnerable to additional lead exposure coming from their water.[17] Differences in mean BLLs can be traced to differences in housing quality, which can affect water supplies, environmental conditions, nutrition, and other factors that often result

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[10] *See*, *e.g.*, CDC, Blood Lead Levels in Children Aged 1–5 Years — United States, 1999–2010 (Apr. 5, 2013), *available at* http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6213a3.htm?s_cid=mm6213a3_e ("An estimated 535,000 U.S. children aged 1–5 years had BLLs ≥5 μg/dL.").

[11] EPA, America's Children and the Environment, 119 (3d ed., 2013), *available at* http://www.epa.gov/opeedweb/children/publications/ACE3_2013.pdf. See also, e.g., America's Children and the Environment, chart on page 125.

[12] EPA, America's Children and the Environment, at 119.

[13] NBEJN, Lead Facts in Black and White and Green, 2 (2005), *available at* http://www.nbejn.org/factsheets/LeadNBEJN-05new.pdf.

[14] *Id.*

[15] CDC, Blood Lead Levels in Children Aged 1–5 Years — United States, 1999–2010 (Apr. 5, 2013), *available at* http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6213a3.htm.

[16] *See*, *e.g.*, EPA, Lead in the Air: Health, last updated Mar. 13, 2012, http://www.epa.gov/oaqps001/lead/health.html ("Once taken into the body, lead distributes throughout the body in the blood and is accumulated in the bones.").

[17] EPA, America's Children and the Environment, at 119.

in the existence of notable racial and income disparities in BLLs.[18] Maternal nutrition can also affect the lead exposure of children, both during and after pregnancy.[19]

The CDC has also recognized that even very low BLLs can cause significant harm to children.[20] It has abandoned its prior practice of defining the "blood lead level of concern" as 10 μg/dL or greater, based on a strong body of evidence that BLLs below 10 μg/dL are associated with significant health effects. In particular, at BLLs less than 10 μg/dL children are reported to suffer irreversible "cardiovascular, immunological, and endocrine effects," IQ deficits, attention deficit disorders and decreased academic performance.[21] The CDC has created a new reference value requiring action, 5 μg/dL. The CDC found that "[t]here are approximately 450,000 U.S. children with BLLs above [the CDC's suggested reference value of 5 μg/dL] that should trigger lead education, environmental investigations, and additional medical monitoring."[22]

For many years, drinking water has been, and continues to be, a significant source of lead exposure.[23] A 2010 CDC study "found that children living in houses with lead pipes were three times as likely to have elevated blood lead as children in houses without lead pipes."[24] "Adults absorb 35%-50% of the lead they drink, and the absorption rate for children may be greater than 50%."[25] The Children's Health Protection Advisory Committee has stated that "it

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[18] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, x (2012), available at http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[19] *See* EPA, Learn about Lead, last updated Apr. 1, 2013, http://www2.epa.gov/lead/learn-about-lead ("During pregnancy, lead is released from bones as maternal calcium is used to help form the bones of the fetus. This is particularly true if a woman does not have enough dietary calcium. . . . Lead can also be transmitted through breast milk.").

[20] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, ix (2012), *available at* http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[21] CDC, Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention, ix (2012), *available at*http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf.

[22] *Id.* at x.

[23] *See, e.g.*, WHO, Childhood Lead Poisoning, 44 (2010) ("Lead plumbing . . . has contaminated drinking-water for centuries, and lead in water can contribute to elevated blood lead concentrations in children"); New York City, New York City Plan to Eliminate Childhood Lead Poisoning, 21 (2005) (identifying the protection of "infants and children from exposure to lead in drinking water" as a key strategy to combat childhood lead poisoning).

[24] *See* David Brown, *Study of D.C. water sharpens understanding of lead threat*, Wash. Post, Dec. 11, 2010, available at http://www.washingtonpost.com/wp-dyn/content/article/2010/12/11/AR2010121102871.html?sid=ST2010122005141.

[25] William L. Roper, et al., Preventing Lead Poisoning in Young Children, ch. 3 (1991), http://www.cdc.gov/nceh/lead/publications/books/plpyc/contents.htm.

has been estimated that 10–20% of the total lead exposure in children can be attributed to a waterborne route, through the consumption of contaminated water."[26] "Exposure to lead via drinking water may be particularly high among very young children who consume baby formula prepared with drinking water that is contaminated by leaching lead pipes."[27]

The most significant source of lead in drinking water is plumbing, particularly in cities with old water systems. "Plumbing that contains lead may be found in public drinking water systems, and in houses, apartment buildings, and public buildings that are more than 20 years old," and even newer systems may contain many components with up to 8 percent lead.[28] Lead-containing service lines, which connect residential plumbing to water mains, are an especially significant source of lead. Such LSLs were commonly used until the mid-1950s,[29]although municipalities may have continued installing them up until 1986 when they were banned. In 1991 EPA estimated that there were at that time "about 10 million lead service lines/connections in the United States and that about 20 percent of all public water systems [had] some lead service lines/connections within their distribution system."[30] EPA's current estimates indicate that there are still roughly 10.3 million full or partial LSLs in the United States.[31] Compounding these problems, "[a]ll water is corrosive to metal plumbing materials to some degree."[32]

In Washington, D.C. for instance, approximately 42,000 children may have been exposed to dangerous levels between 2001 and 2004, during which time "[t]he lead concentrations in the city's water were sometimes hundreds of times higher in individual homes than the amount the

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[26] Letter from CHPAC to EPA, at 8 (Feb. 14, 2013), *available at* http://yosemite.epa.gov/ochp/ochpweb.nsf/content/lead_letter_2013.htm/$File/lead_letter_2013.pdf.

[27] EPA, America's Children and the Environment, 118 (3d ed., 2013), *available at* http://www.epa.gov/opeedweb/children/publications/ACE3_2013.pdf.

[28] ATSDR, Toxicological Profile for Lead, *supra* note 8, at 5; EPA, Lead in Drinking Water.

[29] DC Water and Sewer Authority, Understanding Lead and Water website ("In the U.S., lead service pipes were installed until the mid-1950s. Older properties may still have lead service pipes, which connect the water main in the street to household plumbing.") http://www.dcwater.com/lead/default.cfm (last visited Nov. 06, 2015).

[30] *Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper*, 56 Fed. Reg. 26460, 26466 (June 7, 1991) (hereafter "1991 Lead and Copper Rule" or "1991 LCR"). EPA based its estimate on a survey by the American Water Works Association.

[31] U.S. EPA, Lead Service Line Replacement Primer for Nat'l Drinking Water Advisory Comm. Lead and Copper Rule Working Group (Oct. 22, 2014).

[32] EPA, Consumer Factsheet on Lead in Drinking Water, last updated Mar. 6, 2012, http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/fs_consumer.cfm.

federal government consider[ed] a level of concern."[33] Attempts to repair the lead problem in those homes by replacing only a portion of certain individual LSLs has actually made the problem worse.[34] EPA's 2010 analysis showed that in D.C. homes with LSLs, 26.5% percent of children had blood-lead levels of 5.0 μg/dL or higher and 6% had BLL of 10.0 μg/dL or higher.[35]

The District of Columbia is not alone. During the last decade, studies in numerous cities have revealed high levels of lead in school drinking water, including: Seattle, WA;[36] Durham, NC;[37] Philadelphia, PA;[38] Syracuse, NY;[39] Baltimore, MD;[40] Portland, OR;[41] and San Francisco,

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[33] Carol D. Leonnig, *High Lead Levels Found in D.C. Kids*, Wash. Post, Jan. 27, 2009, available at http://articles.washingtonpost.com/2009-01-27/news/36849769_1_blood-lead-harmful-levels-water-crisis.

[34] *Id.*; *see also* Brown, et al., Association between children's blood lead levels, lead service lines, and water disinfection, Washington, DC, 1998–2006, Environ. Res. (2010), doi:10.1016/j.envres.2010.10.003.

[35] Letter from Mary Jean Brown, Chief, Healthy Homes and Lead Poisoning Prevention Branch, CDC to Lead Poisoning Prevention Program Managers, Important update: Washington, D.C. Blood Lead Level Tests (May 20, 2010), http://www.cdc.gov/nceh/lead/blood_levels.htm. In D.C. homes without a lead service line (but where there was still potential lead exposure inside the home's plumbing), 13.4% had blood-lead levels of 5.0 μg/dL or higher and 2% had BLL of 10.0 μg/dL or higher.

[36] Sanjay Bhatt, *Drinking Water to be Tested at All Seattle Schools*, Seattle Times, Dec. 18, 2003, at B1.

[37] Michael Petrocelli, *School's Drinking Fountains Shut Down: 'Actionable' Lead Amounts Turn up at Y.E. Smith Magnet*, Herald-Sun, Aug. 4, 2004, at C1; see also Catherine Clabby, Expert Faults EPA on Lead: Chemical Change Cited in Durham Water Tests, News & Observer, June 30, 2006,

http://www.newsobserver.com/politics/story/456206.html.

[38] *Pennsylvania: Philly Schools Find Unsafe Lead Levels in 20 Percent of Water Outlets*, eSchool News Online, Dec. 1, 2000, http://www.eschoolnews.com/news/showstory.cfm?ArticleID=2003.

[39] Maureen Nolan, Schools to Get Drinking Faucet Filters: The Project is Intended to Reduce the Levels of Lead in City Schools' Drinking Water, Post-Standard, Aug. 17, 2003, at B3; Government Accountability Office (GAO), Drinking Water: EPA Should Strengthen Ongoing Efforts to Ensure that Consumers are Protected from Lead Contamination 50-53 (2006). Syracuse found almost two dozen schools with high lead levels in the drinking water after performing tests at the request of the EPA, which was concerned about high blood-lead levels among the city's children. D'Vera Cohn, EPA Asks for States' Plans on Lead: Widening Water Problem Spurs Action, Wash. Post, ar. 28, 2004, at C01.

[40] Tanika White, Fountains with Lead Remained in Schools: Plan to Use Bottled Water Was Never Carried Out, Despite Contamination, Baltimore Sun, Feb. 7, 2003 , at 1B.

CA.[42] Most recently, Flint, MI saw a spike in lead levels at residents' taps when the city switched its source of drinking water without taking necessary steps to control corrosion of lead pipes in its water system.[43] Testing revealed elevated levels of lead in the blood of Flint children, and some local schools were forced to turn off their water fountains when sampling revealed lead levels in excess of federal standards.[44] The lead contamination crisis in Flint can be traced in part to an apparent failure to follow water treatment procedures mandated by the current LCR. Nonetheless, it underscores the ongoing threat that lead-contaminated water poses to public health twenty-four years after the LCR was first promulgated, and the need for more stringent enforcement of the human health safeguards under the LCR.

II. Regulatory History

The Safe Drinking Water Act ("SDWA"), 42 U.S.C. 300f *et seq.*, requires EPA to set standards for drinking water quality, including maximum levels for contaminants that may have an adverse effect on the health of persons. SDWA applies to every public water system ("PWS") in the United States. A PWS is defined as "a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals."[45]

EPA published the Lead and Copper Rule in 1991 in response to Congress' 1986 amendments to the SDWA.[46] EPA had originally contemplated setting a maximum contaminant level of zero for lead in drinking source water, but in the final 1991 rule EPA agreed with commenters who "argued that setting [a maximum contaminant level] for levels in source water in addition to the treatment technique requirements for corrosion by-products would result in unnecessary confusion among the public and the regulated community."[47] Instead of setting a maximum contaminant level, EPA adopted a final rule "consisting solely of a treatment technique that seeks to remedy all sources of lead and copper contamination caused by both

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[41] Michelle Cole, *Schools Shut Off Drinking Fountains*, Oregonian, Aug. 25, 2001, at A01.

[42] Nanette Asimov, Toxic Lead Found in Schools: Paint, Drinking Water Tested in S.F. District, San Francisco Chronicle, Nov. 14, 2000, at A21.

[43] Monica Davey, Flint Will Return to Using Detroit's Water After Findings of Lead in Local Supply, New York Times, Oct. 9, 2015, at A16.

[44] *Id.*

[45] 42 U.S.C. § 300f (4)(A).

[46] 1991 Lead and Copper Rule, 56 Fed. Reg. at 26460. Before 1991, under an interim rule published by EPA in 1975, the maximum contaminant level for lead was 0.050 milligrams per liter. *Id.* at 26463.

[47] *Id.*, 56 Fed. Reg. at 26472.

corrosion and contaminated source water."[48] EPA also established a maximum contaminant level *goal* of zero, and stated that "[t]he goal of [the] rule is to provide maximum human health protection by reducing the lead and copper levels at consumers' taps to as close to the [maximum contaminant level goal] as is feasible."[49]

The treatment technique requirements include corrosion control treatment, source water treatment, LSL replacement, and public education. The rule requires each PWS to monitor a specified number of sites depending on the size of the system.[50] Treatment techniques are triggered if samples show an exceedance of the "lead action level" under the rule, which is "exceeded if the level of lead in more than 10 percent of the targeted tap samples is greater than 0.015 mg/L (90th percentile)."[51]

Spurred by the aforementioned reports of lead contamination in the District of Columbia's drinking water, EPA conducted a one-year review of the nationwide implementation of the LCR beginning in 2004.[52] The review identified a number of "targeted changes" to improve the LCR's efficacy in the short term as well as several issues to be addressed over longer-term rulemakings.[53] In 2007 EPA promulgated regulations addressing the short-term revisions to the LCR.[54]

EPA has taken the first steps in crafting regulations to address the more substantial, long-term issues identified in the 2005 report, a process known as the LCR long-term revisions.[55] Before EPA publishes regulations for public comment, the SDWA provides that the agency will consult NDWAC, which is composed of representative from utilities, advocacy groups, and the general public appointed by the EPA Administrator.[56] In anticipation of the LCR long-term revisions, EPA requested that NDWAC establish the LCR Working Group, tasked with

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[48] *Id.*

[49] *Id.*, 56 Fed. Reg. at 26478.

[50] 40 C.F.R. § 141.86(d)(2).

[51] *Id.*; 40 C.F.R. § 141.80(c)(1).

[52] *See* Drinking Water Lead Reduction Plan Fact Sheet, *available* at http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/upload/2009_08_11_lcrmr_pdfs_Drinking_Water_Lead_Reduction_Plan.pdf.

[53] *Id.*

[54] 72 Fed. Reg. at 57782.

[55] Report of the Lead and Copper Rule Working Group to the National Drinking Water Advisory Council ("LCR WG Report") 9.

[56] 42 U.S.C. § 300j-1(a).

analyzing the LCR and developing recommendations to improve the regulations.[57] The Working Group released its Report to NDWAC on August 24th, 2015 after over a year of deliberations, with one member dissenting.[58]

III. The Lead and Copper Rule Working Group Report

The Report recognizes the urgent necessity of revising the LCR, highlighting "questions of disparate impact and environmental justice" in lead contamination of drinking water and noting the need to incorporate advances in scientific knowledge since the current LCR was promulgated.[59] To that end, the Report offers five broad recommendations to improve the LCR's approach to removing lead from drinking water: encouraging the removal of all LSLs, modifying tap water monitoring requirements, improving corrosion control treatment ("CCT"), expanding public education ("PE") programs, and establishing a household action level for lead.[60] Making proactive LSL removal the cornerstone of the LCR's lead remediation program is an important step forward from the current LCR, which mandates LSL removal only when a PWS exceeds the lead action level. Because full LSL removal can take years or decades to complete, minimizing public exposure to lead contamination in the interim is essential. Accordingly the Report's remaining recommendations highlight significant shortcomings and gaps in the current LCR's monitoring, education, and water treatment provisions.

Even as the Report acknowledges the severity of the threat that lead-contaminated drinking water poses to public health, its recommendations fall short of what needs to be done to effectuate the purpose of the LCR—i.e., "to provide maximum human health protection by reducing the lead and copper levels at consumers' taps."[61] Merely *encouraging* PWSs to adopt proactive LSL replacement goals does nothing to ensure accelerated LSL removal absent consequences for failing to meet LSL removal targets. The Report's recommendations regarding PE and the household action level should also be strengthened to ensure that they lead to robust action to protect public health. More troublingly, the proposals to modify the LCR's tap monitoring and CCT provisions would likely *reduce* the efficacy of these essential parts of the rule's treatment technique.

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[57] LCR WG Report at 9.

[58] Yanna Lambrinidou, Statement of Dissent from the Report of the Lead and Copper Rule Working Group to the EPA National Drinking Water Advisory Council ("Dissent").

[59] LCR WG Report at 5.

[60] LCR WG Report at 2-3. The Report also includes recommendations to improve the LCR's program for addressing copper contamination, which are not addressed in this comment.

[61] *Id*., 56 Fed. Reg. at 26478.

A. Proactive Replacement of All Lead Service Lines

The Report states, "[r]emoving the sources of lead in drinking water should be a national goal. More proactive action than has been taken to date is needed to achieve it."[62] Accordingly, the Report calls for the LCR to encourage all PWSs to establish a LSL replacement program "that effectively informs and engages customers to share appropriately in fully removing LSLs."[63] The Report gives a suggested replacement schedule, which begins with a target of 15% of the initial number of LSLs replaced every three-year increment, gradually reduces replacement targets after fifteen years, and concludes with full LSL replacement after thirty years.[64] This proposal departs from the current LCR's policy of requiring LSL replacement only for PWSs that exceed their lead action level[65] and would thus seem to embody a more proactive effort to remove the main source of lead in drinking water.

However, this apparent improvement is undermined by the Report's failure to recommend enforcement measures for the LSL replacement requirements in the revised LCR.[66] The Report recommends that LCR violations would only occur when there are inadequacies in a PWS's customer-outreach efforts, or when a PWS fails "to step up intensity of efforts" if it does not meet its three-year LSL replacement targets.[67] Conspicuously absent is a mechanism for actual enforcement of LSL replacement targets. The LCR must do more than merely *encourage* LSL replacement. The Report appears to suggest that EPA's powers under the SDWA are insufficient to require proactive full LSL replacement,[68] but such a suggestion has no legal basis.[69] Failure by a PWS to reach LSL replacement goals should constitute a violation of the LCR.

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[62] Working Group Report at 13.

[63] *Id.* at 14.

[64] *Id.* at 45.

[65] 40 C.F.R. § 141.84(a).

[66] In contrast, the current LCR institutes a strict schedule of LSL replacement (at least seven percent per year) for PWSs that exceed the lead action level. 40 C.F.R. § 141.84.

[67] LCR WG Report at 19.

[68] *Id.* at 13 ("[removing the sources of lead in drinking water] will require a concerted effort by many, and cannot be accomplished solely through the authorities provided under the Safe Drinking Water Act. . . .").

[69] It is true that the current policy of making PWSs responsible for replacing only those LSLs that they are deemed to own—leaving property owners responsible for the LSLs running under their property—has been a major obstacle to full LSL replacement, but nothing in the SDWA or any other law demands that EPA continue this misguided policy. This issue is discussed in further detail below.

Partial LSL Replacement

The Report notes that the current LCR does not create sufficient incentives to remove and replace the entire length of each LSL—the main source of lead in drinking water—and instead creates a regulatory environment that has encouraged widespread partial LSL replacement.[70] The Report also cites studies showing that partial LSL replacement is ineffective at reducing the amount of lead in drinking water and leads to elevated lead levels in the short term.[71] But the Report does not follow this line of reasoning to its logical conclusion and recommend a prohibition against partial LSL replacement. Instead, it provides a list of "justifiable exceptions" to the general policy of encouraging full LSL replacement, including: "emergency repairs where property owners have refused to participate in a full LSL replacement; during a main replacement project; or when a sufficiently high percentage of property owners participate in an area –wide LSL replacement project to justify replacing LSLs to the property lines of those who do not participate at the time."[72] This list of recommended exceptions is completely at odds with the goals for the LCR long-term revisions, and threatens to undermine the public health-protection purposes of those revisions.

The revised LCR should ban partial LSL replacement. As an initial matter, the Report does not document the need for an "emergency repair" exception that would justify replacing less than one hundred percent of an LSL. Moreover, the above list of exceptions has troubling implications for environmental justice that mirror a major inequity of the current LCR lead-control regime. In many cities, property owners unable to pay to replace the LSLs running under their property were subjected to partial LSL replacement when their PWS replaced utility-owned LSLs up to the property line. Because partial LSL replacement can increase lead levels short term and has been shown to be ineffective at remediating lead contamination long-term, the current LCR's mandatory LSL replacement measures had the perverse result of *increasing* the amount of lead flowing through the taps of many consumers. A person's ability to pay thus became a major determinant of the level of lead contamination in her and her family's water in many places.

In focusing on property owners who have "refused to participate in a full LSL replacement," the Report appears to have missed the point. While there may exist homeowners who refuse to consent to full LSL replacement out of recalcitrance, by far the more pressing obstacle arises from lack of financial resources. Allowing partial LSL replacement to proceed when a "sufficiently high percentage" of customers in an area elect to participate would expose some unfortunate people to the known dangers of partial LSLs, **simply because of their inability to pay**. To its credit, the Report does call for "risk management" measures for

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[70] LCR WG Report at 19.

[71] *Id.*

[72] *Id.* at 14.

customers left with partial LSLs, such as providing filters and plastic piping,[73] but such stopgap measures are no substitute for full LSL removal.

Service line ownership

The current approach to questions concerning the ownership and control of LCRs is directly tied to an increased likelihood of partial LSL replacement. Service lines include portions owned by utilities as well as portions deemed to be owned by individual customers. Under the current LCR, a PWS is responsible for replacing only the portion of an LSL that it owns; for any remaining portion that is deemed to be privately-owned, the PWS is only required to offer to replace that portion of the LSL at the customer's expense.[74] The LCR's apportionment of shared responsibility for LSL replacement between utility and customer is a major reason for the prevalence of partial LSL replacement, as customers are often unable to shoulder the expense of replacing their portion of a service line, which is typically estimated to range from $1,000 to $7,000.[75] Additionally, PE materials provided by PWSs may fail to adequately inform customers of the public health purpose of LSL replacement, the nature of utility and homeowner rights and responsibilities regarding service lines, and the comparative benefits and risks of full LSL replacement and partial LSL replacement.[76]

The Report states that the Working Group discussed but did not reach a consensus on the question of whether the LCR should make PWSs responsible for replacing LSLs under their "control," which could encompass LSLs deemed to be owned by customers where the PWS has the authority to repair, replace, or maintain the LSL.[77] A control-based approach would support full LSL replacement. In contrast, the Report's continued emphasis on having customers "share appropriately" in LSL replacement threatens to perpetuate the existing inequities of the LCR's shared responsibility system. Over twenty years of history have shown that when property owners are asked to pay for full LSL replacements, the vast majority decline to do so, many for no reason other than inability to pay. In Washington, D.C. for example, through the duration of the city's service line replacement program from 2003 to 2008, only 15% of property owners

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[73] *Id.*

[74] 40 C.F.R. § 141.84(d).

[75] *See* Yanna Lambrinidou and Marc Edwards, Improving Public Policy through Qualitative Research: Lessons from Homeowners about Lead Service Line Replacement under the Federal Lead and Copper Rule (presentation at 141st APHA Annual Meeting and Expo, Nov. 2-6, 2013, Boston, MA).

[76] *Id.*

[77] LCR WG Report at 18.

elected to have a full replacement—2,128 out of 14,260 service lines that were ultimately replaced.[78]

Among other failings, use of the "ownership" test presumes that (1) the property owner is knowingly assuming the risk of leaving private-owned LSLs in place, (2) the property owner is in fact the one who will be exposed to this risk, and (3) that everyone has the ability to pay for LSL replacement if they deem the risk significant. None of these assumptions is true. First, unless and until public education efforts are significantly ramped up and have had sufficient time to penetrate the public consciousness, property owners will be largely unaware of the risks they are assuming when choosing partial LSL replacement. Second, those renting their homes will likely have no say in the matter at all. Home ownership rates, which are low in general among the nation's poorest families,[79] are disproportionately low for African Americans and certain other racial/ethnic groups, as well.[80] Lastly, and most importantly, a property owner's ability to pay should not affect her risk of lead exposure. The "ownership" test prejudices poor families and families of color, and hurts families who are not adequately informed of the risks of lead exposure.

The Report attempts to resolve this last failing by suggesting research into "creative financing possibilities," such as a possible IRS tax refund to families who choose full LSL replacement, but none of its suggestions are adequately explained and none address the other failings of the "ownership" test. The problem is that by dividing responsibility, the "ownership" test requires complicated solutions. Some entity has to come up with funding, which it can give to the property owner, who can then pay the PWS. Control is much simpler to establish, greatly reduces the number of actors and decision-makers involved, and avoids the need for complex financing solutions to mitigate environmental justice concerns

The Report points to state prohibitions on spending public funds on private property and the difficulty of gaining physical access to private property as major obstacles to a control-based LSL replacement scheme,[81] but these are more easily surmounted than the difficulties of

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[78] The District of Columbia and Communities Nationwide Face Serious Challenges in Their Efforts to Safeguard Water Supplies, GAO-08-687T at 6-8 (April 15, 2008); *see also* GAO-05-344, *Agencies Have Improved Coordination, but Key Challenges Remain in Protecting the Public from Elevated Lead Levels*, Report to the Chairman, Subcommittee on Environment and Hazardous Materials, Committee on Energy and Commerce, House of Representatives (March 2005), p. 4 (raising the same concerns as in 2005).

[79] http://www.huduser.gov/Publications/pdf/HomeownershipGapsAmongLow-IncomeAndMinority.pdf at 91

[80] http://www.huduser.gov/Publications/pdf/HomeownershipGapsAmongLow-IncomeAndMinority.pdf at 85

[81] LCR WG Report at 18.

implementing the current ownership-based system. The public benefit doctrine found in many state constitutions poses no barrier to an LSL replacement program that clearly aims to promote public health. The application of this doctrine may vary from one state to another, but in general a public purpose "has for its objective the promotion of public health, safety, morals, security, prosperity, contentment, and the general welfare of the community."[82] The term "public purpose" is broad and should not be construed "in a narrow or restrictive sense."[83] A public purpose may be served even if it involves making payments to individuals.[84] Additionally, property rights can be respected by requiring the PWS to obtain a "right of entry" from property owners—a choice that will not depend on owners' ability to pay. Lastly, funding for replacement projects can be obtained in numerous ways, with the unifying characteristic that only one party, the PWS, needs to be involved in the transaction.

Nor does the history of litigation over the 1991 LCR justify retaining the ownership approach. In response to a challenge by the American Water Works Association, the D.C. Circuit struck down EPA's definition of "control" in the final 1991 rule, solely on the grounds that "EPA failed to provide adequate notice that it would adopt a novel definition of control."[85]

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[82] Slawson v. Alabama Forestry Comm'n, 631 So.2d 953, 956 (Ala. 1994); Clifford v. City of Cheyenne, 487 P.2d 1325, 1329 (Wyo. 1971); Platte Valley Public Power & Irrigation Dist. v. Lincoln County, 14 N.W.2d 202, 205 (Neb. 1944); State ex rel. McClure v. Hagerman, 98 N.E.2d 835, 838 (Ohio 1951); Greensboro-High Point Airport Authority v. Johnson, 226 N.C. 1, 15 (N.C. 1946); State ex rel. Warren v. Nusbaum, 59 Wis.2d 391, 423 (Wis. 1973); City of Pipestone v. Madsen, 287 Minn. 357, 366 (Minn. 1970).

[83] Burkhardt v. City of Enid, 771 P.2d 608, 610 (Okla. 1989); Madison Cablevision, Inc. v. City of Morganton, 325 N.C. 634, 646 (N.C. 1989); Dannheiser v. City of Henderson, 4 S.W.3d 542, 546 (Ky. 1999) (and cases cited therein).

[84] See Ullrich v. Bd. of Cnty. Comm'rs of Thomas Cnty., 234 Kan. 782, 788-89 (Kan. 1984) ("The generally recognized rule is that a state legislature may appropriate public money or property for private individuals, if thereby the public welfare is promoted."); see also Mountain Water Co. v. Montana Dept. of Public Service Regulation, 919 F.2d 593, 601 (9th Cir. 1990) (upholding a requirement applicable to privately-owned water utilities "to help assure service line maintenance [and] redistribute the cost of service line maintenance among all customers.").

[85] *Am. Water Works Ass'n v. E.P.A.*, 40 F.3d 1266, 1275 (D.C. Cir. 1994). The D.C. Circuit viewed EPA's definition of "control" as novel because "public water systems generally *own* only that part of the service line that underlies public property." *Id*. at 1274. (emphasis added). However, the proposed rule had clearly rebuttable presumption "that the water supplier owns *or controls* and therefore can replace, *the lead components up to the wall of the building served*." Drinking Water Regulations; Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, 53 Fed. Reg. 31516, 318548 (Aug. 18, 1988). The court also reasoned that the only case to have interpreted the definition of "public water system" was a 1988 ruling of the Georgia Supreme Court interpreting the Georgia Safe Drinking Water Act,

Any questions regarding the scope or meaning of "control" could be addressed in a new rulemaking that provides ample public notice to affected PWSs. To the extent there is any merit to the American Water Works Association's substantive allegations against the 1991 control rule – that EPA lacked authority to adopt a control-based rule, and that the definition was impermissibly vague because EPA did not indicate whether the rule created a right of entry on private property – EPA can address those issues in a new rulemaking.

LSL inventory

An additional defect in the Report's LSL replacement proposal is its LSL accounting scheme. The Report has two related recommendations for improving PWSs knowledge of LSLs within their system:

1) A "presumption that a service line put in place prior to the date when lead service lines were prohibited has leaded materials unless the PWS has information to confirm that it [does] not."
2) "Providing credit to a PWS toward its replacement goals for demonstrating that a service line presumed to include lead does not have leaded materials."

This second suggestion serves only to undermine the stated purpose of the LSL replacement program and could lead to significant delays in implementing full LSL replacement. Giving "credit" for existing service lines that do not contain lead would allow a PWS to replace *fewer* LSLs than it would otherwise have to in a given year, a result squarely contrary to the goal of rapid LSL replacement. It would also create a perverse incentive for PWSs to characterize as lead-free service lines that are of uncertain or ambiguous composition. Because this recommendation has no apparent public health justification, EPA should reject it and instead focus on different ways to require or incentivize accelerated LSL inventories by all PWSs.

B. Monitoring

If implemented, the Report's recommendations regarding lead monitoring would likely result in a weaker monitoring regime than the current LCR's. PWSs are currently required to

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which was identical to the definition of a PWS under the SDWA, as "confining the regulatory authority to portions of the service line *not underlying private property*." *Am. Water Works Ass'n* at 1275, citing *Bass v. Ledbetter,* 257 Ga. 738, 363 (Ga. 1988) (emphasis added). But EPA's proposal clearly went beyond the Georgia court's interpretation by presuming that "lead components up to the wall of the building served" could be within a PWS's "control." Nonetheless, because EPA had given "control" a specific definition that was not articulated in the proposed rule, and had deviated from the Georgia court's interpretation of "PWS" under the state's law, the D.C. Circuit concluded that interested parties could not "reasonably have anticipated the final rulemaking." *Am. Water Works* at 1275.

measure levels of lead in their water through periodic monitoring, which includes targeted tap water sampling,[86] source water monitoring,[87] and monitoring of Water Quality Parameters ("WQPs") at various points in the system.[88] Data collected on WQPs, including , alkalinity, conductivity, temperature, and calcium, is used to assess the corrosivity of the water supply.[89] Data obtained from sampling at individual drinking water taps is used to ascertain whether a PWS exceeds the LCR's Lead Action Level, which triggers mandatory response measures such as LSL replacement.[90] The Report finds fault in the current monitoring regime, citing "numerous challenges" and focusing in particular on "difficult and costly" in-home tap water sampling.[91] The Report recommends replacing the LCR's monitoring program with the following 2-part program: "1) a more robust WQP monitoring program to improve process controls for CCT, and 2) voluntary customer initiated sampling. . . to provide direct information to consumers that they can use to reduce potential exposures to lead from drinking water. . . and to provide ongoing information to the PWS to identify and correct unanticipated problems. "[92] The Report also calls for increased customer outreach to encourage voluntary tap sampling, including a "menu" of sampling protocols for customers to choose from.[93]

This proposal is deeply misguided. As noted above, WQP monitoring was instituted under the 1991 Lead and Copper Rule as a means for assessing the corrosivity of water. The Report offers no evidence that WQPs provide a reliable indicator of lead levels at consumers' taps.[94] Surrogate measuring should only be used when direct measuring of a contaminant is prohibitively costly or otherwise impossible *and* where the surrogate measure provides the most reliable indirect measure of the presence of the targeted contaminant. This is not the case with lead, which can be readily measured in tap samples and for which WQPs cannot not provide a reliable surrogate measure. The Report fails to justify deemphasizing targeted tap sampling in favor of a method known to be a less reliable indicator of lead levels. Simply put, the most reliable way to ascertain lead levels at consumers' taps is to measure lead levels at

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[86] 40 C.F.R. § 141.86.

[87] 40 C.F.R. § 141.88.

[88] 40 C.F.R. § 141.87.

[89] 1991 Lead and Copper Rule, 56 Fed. Reg. at 26466.

[90] 40 C.F.R. § 141.84(a).

[91] LCR WG Report at 30, 32.

[92] *Id.* The Report notes, "[i]t seems appropriate to include some sort of floor to the number of customer samples. Some members of the [Working Group] suggested that systems should be required to collect no fewer samples in a three year period than they would under the current three-year reduced monitoring requirement." *Id.* at 34.

[93] *Id.*

[94] Dissent at 13.

consumers' taps. Eliminating mandatory, targeted tap water sampling and replacing it with voluntary, consumer-driven sampling would further undermine the goal of effectively monitoring lead levels. Because volunteer sampling assumes that consumers will have a sufficient understanding of the need for sampling, it is more likely to produce data from households that enjoy higher socio-economic status, education level, and English language skills. For that and other reasons, volunteer sampling according to consumer-chosen protocols would yield only sporadic data that would be of little use in ascertaining system-wide lead levels.

Effective tap water monitoring demands a systematic, targeted approach. Lead levels can vary greatly depending on location within a water system and over time,[95] so even tap sample data indicating low lead levels at a large number locations throughout a PWS can belie a situation in which some customers are being exposed to unacceptably high levels of lead. Accordingly, tap sampling should target the homes at highest risk of lead contamination, as mandated in the current LCR.[96]

There is ample room for improvement to the current LCR's tap water monitoring regime, but any changes should make tap monitoring more effective, not less so. For example, the current LCR mandates that nearly all tap samples be "first-draw" samples,[97] a technique that is now known to significantly underestimate actual lead levels.[98] Sampling protocols should be revised to reflect up-do-date scientific knowledge, including a ban on practices such as "pre-flushing" that are known to underestimate lead levels. Additionally, the LCR should mandate that uniform protocols be used throughout the system to ensure a consistent, useful pool of data on lead levels.

Sample invalidation

Under the current LCR a PWS can request that its state invalidate tap water samples for a limited number of reasons, such as damage to the sample container or error in laboratory analysis.[99] The Report asserts that this closed list of sample invalidation criteria leads to instances in which "samples that are obvious 'outliers' and don't represent the water that is normally consumed and should not be used as a basis for treatment changes or public education" must be accepted.[100] The Working Group urges EPA to "expand the invalidation

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[95] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26514.

[96] 40 C.F.R. § 141.86(a).

[97] 40 C.F.R. § 141.86(b).

[98] Dissent at 14.

[99] 40 C.F.R. § 141.86(f).

[100] LCR WG Report at 34.

criteria" to reflect this concern.[101] This proposal would create an unnecessary and potentially disastrous loophole. The current list of sample invalidation criteria focuses on errors in sample collection, without taking into account the testing results of a given sample. Expanding sample invalidation criteria to allow the exclusion of "outliers" could allow PWSs to disregard valid samples simply because their results show high lead levels. Such a policy would undercut the very rationale for having a sampling program, and it could become a means for a PWS to create the appearance of low overall lead levels while failing to address lead contamination in homes within the system. Under no circumstances should a PWS be allowed to invalidate an otherwise valid sample after seeing the testing results.

C. Corrosion Control Treatment

CCT is the most important aspect of the LCR's lead control treatment technique because it can dramatically reduce the amount of lead that leaches from lead pipes into drinking water if properly implemented. The current LCR CCT regime contains several flaws that prevent it from realizing this potential. Unfortunately, rather than addressing these flaws head-on, the Report's CCT proposals would likely result in a *weaker* CCT regime than the current LCR.

The goal of CCT is to minimize corrosion of lead-containing pipes, thus reducing the amount of lead leaching from those pipes into water destined for human consumption. Each PWS varies in factors such as size, source water, and age of the physical infrastructure, and each of these affects pipe corrosions. Accordingly, CCT needs to be calibrated to fit local circumstances. The LCR currently requires all large PWSs to develop optimal CCT, defined as CCT "that minimizes the lead and copper concentration at users' taps while insuring that the treatment does not cause the water system to violate any national primary drinking water regulations."[102] Small and mid-size PWSs are required to develop optimal CCT if they are unable stay below the action level for lead.[103] The LCR also requires that PWSs periodically assess their CCT through monitoring of WQPs, and PWSs able to maintain WQPs within established ranges are deemed to have effective CCT.[104]

This CCT regime has been marred by failures of implementation and flaws of design. To implement optimal CCT, the current LCR directs all large PWSs to conduct extensive studies and develop optimal CCT in cooperation with their respective states; the 1991 regulations provide a schedule of seven steps over six years (1993-1998) for them to complete this task.[105] Despite these clear instructions, few large PWSs conducted the studies necessary to develop

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[101] *Id.*

[102] 40 C.F.R. § 141.2.

[103] 40 C.F.R. § 141.82(a)(2).

[104] 40 C.F.R. § 141.82(g).

[105] 40 C.F.R. § 141.82(d).

optimal CCT.[106] Instead, most large PWSs have implemented ad hoc CCT with the goal of staying below the lead action level (15 parts per billion).[107] In effect, these PWSs have been held to a less stringent standard for CCT than the standard called for in the LCR's CCT optimization provisions, which demand that PWSs achieve *minimization* of lead levels. Regarding the current CCT assessment provisions, the LCR Working Group dissenter and others have pointed out that WQP monitoring is an imperfect indicator of actual lead levels. Indeed, only 172 PWSs have failed to maintain WQPs within established ranges since 1991, yet over 6,000 PWSs have exceeded the lead action level in that time.[108] In other words, that a PWS is able to maintain acceptable WQPs does not guarantee CCT achieving low lead levels at the tap.

The Report takes up both CCT optimization and CCT assessment. Noting that optimal CCT depends upon up-to-date science and attention to local conditions,[109] the report recommends that EPA develop a new CCT guidance manual "as soon as possible" and update the manual every six years; it also suggests that large PWSs be required to review their CCT plans in light of the updated manual and be required to do so in every six year rule review cycle.[110] To improve CCT assessment, the Report recommends that CCT be evaluated according to the "regular stream of data" from voluntary customer tap water sampling under the monitoring regime described above.[111] All customer sampling data would be compiled and reported to the state; if the most recent three years of customer sampling data shows the 90th percentile to be above the action level for lead, the PWS would be required to determine if "analysis, re-evaluation of CCT, or other actions. . . are appropriate."[112]

These recommendations do not adequately address the shortcomings of the current CCT regime, and linking assessment to voluntary customer tap sampling would further reduce CCT's efficacy. As noted above, switching from targeted tap sampling to voluntary, customer-initiated sampling would result in a much weaker pool of data about lead levels within a water system. Coupling CCT assessment to less accurate information about lead levels within a PWS can only weaken CCT. The Report's recommendations regarding CCT optimization would be a step in the right direction, but they do not go far enough in addressing the history of large PWSs failing to comply with the LCR's explicit directives on CCT optimization.

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[106] Dissent at 14.

[107] *Id.*

[108] *Id*. at 13.

[109] LCR WG Report at 29.

[110] *Id.* at 30.

[111] *Id*. at 33.

[112] *Id.* Although three years of sampling data would be used to calculate the 90th percentile, PWSs could be required to report sampling data annually "at the discretion of the primacy agency."

CCT is a science-based treatment technique that requires accurate information on actual lead levels, continual monitoring, and attention to the individual circumstances of each PWS. Although the precise contents of an effective CCT regime are beyond the scope of this comment, the dissenting Working Group member suggests that it will require at minimum: (1) robust monitoring of lead levels in water; (2) true CCT optimization in large PWSs, i.e. CCT that minimizes lead corrosion without violating other national water quality standards; (3) mandatory corrective action by a PWS if the lead action level is exceeded; and (4) a compliance mechanism that links CCT to lead levels at the tap.[113]

D. Household Action Level

The Report's proposal to establish a household action level for lead addresses an important gap in the LCR, but it needs to be bolstered if it is to adequately fill that gap. The current LCR calculates the lead action level with reference to the 90th percentile of all tap water samples in a system. Accordingly, samples from individual dwellings can contain high levels of lead without triggering the lead action level for the PWS as a whole. The Report calls for the creation of a "household action level" to address this problem: if a tap sample exceeds the household action level, the PWS would be required to notify local health departments and the state drinking water authority.[114] This proposal addresses an important gap in the current LCR, but in its current form its efficacy is limited. The proposed household action level does not mandate any action by health departments upon notification of an exceedance of the household action level, nor can it, as the SDWA does not give EPA authority to regulate local health departments. The Report acknowledges as much, incongruously stating, "while the LCR cannot guarantee actions by health departments, this recommendation provides direct health intervention in those cases where sampling indicates high lead levels.[115] Instead of merely providing that PWSs notify local health authorities of exceedances of the household action level, the LCR should require PWSs to take immediate remedial action in the affected homes and to ensure that the affected residents have adequate health safeguards until the danger is eliminated.

E. Public Education

Public Education ("PE") is an essential part of the LCR. The public remains under-informed of the dangers of lead contamination of drinking water, and of the "shared responsibility" the LCR expects them to take to protect themselves and their families. The

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[113] Dissent at 15.

[114] LCR WG Report at 36. The Working Group recommends that the household action level be set with reference to the amount of lead it would take to induce an average, healthy infant drinking formula to have blood lead levels of greater than five micrograms per deciliter. *Id.* at 37.

[115] *Id.* at 32-33.

Report calls for greater efforts to disseminate information about the risks of lead contamination in drinking water through PE materials. Specifically, it recommends establishing a "national clearinghouse" of PE materials for use by PWSs; requiring PWSs to send PE materials to all new customers; revising the language of Consumer Confidence Reports ("CCRs"); requiring PWSs to make publicly available information about LSLs and other information related to lead contamination; and expanding outreach to health care providers serving populations vulnerable to lead poisoning.[116] These proposals would do much to improve PE regarding lead contamination of drinking water, and several suggestions to further improve this facet of the LCR are included below.

However, both the current LCR and the Report leave unaddressed two of the most serious contributors to spikes in lead contamination of drinking water: physical disturbance of lead-containing pipes and period of disuse of lead-containing pipes. These pressing problems are described in further detail below.

Revisions to CCR language

SDWA regulations require PWSs to deliver annual CCRs to customers for any contaminants detected in their water.[117] The Report includes suggested revisions to the language of the CCR for lead to reflect up-to-date science, notify customers of resources available in the national clearinghouse, and emphasize that "customers play an important role in protecting themselves from exposure to lead."[118] As a "starting point," it recommends adding the following language:

> Your water utility is required to minimize the corrosivity of the water. However, because every home is different, the amount of lead in your tap water may be lower or higher than the monitoring results for your public water system as a whole. You can take responsibility for identifying and removing lead materials within your home plumbing and taking steps to reduce your family's risk. If you have lead service lines or lead-bearing materials in your home, [you may wish to have your water tested.][119]

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[116] LCR WG Report at 21-22.

[117] 40 C.F.R. § 141.151(a). The current CCR language for lead can be found at 40 CFR § 141 Appendix A to Subpart O.

[118] LCR WG Report 24.

[119] *Id*. Bracketed portion is language from the current CCR.

Improving the efficacy of CCR is an important goal, but the Report's emphasis on CCR ignores the documented inadequacies of that medium as an educational vehicle.[120] Furthermore, this suggested language does not do enough to inform water consumers of the role the LCR regime expects them to play in protecting themselves from preventable exposures to lead contamination.

Transparency

The Report recommends that the LCR require PWSs to make available to the public information regarding: 1) "the number of samples over the Household Action Level, median, 90th percentile, and highest level found in the last monitoring period" and 2) "CCT treatment, approved WQP ranges and WQP results from the last monitoring period."[121] It also recommends that EPA "encourag[e]" PWSs to provide information on PE materials, sampling protocols, individual sampling results, and inventory/maps of LSLs.[122] These proposals to increase the amount of information available to consumers would be strengthened by *requiring* that PWSs provide the information that the Working Group recommends EPA only *encourage* PWSs to provide.

IV. Issues not Addressed in the LCR Working Group Report

Beyond the discrete issues identified above, the Report omits or gives insufficient attention to two important aspects of the problem of lead contamination of drinking water that must be addressed in the LCR long-term revisions: exposure factors now known to cause spikes in lead levels at drinking water taps, and the persistence of disparities in exposure to lead-contaminated water based on income, race, and ethnicity.

Physical Disturbances and Scale Deterioration

Scientific knowledge of the problem of lead contamination has advanced in the twenty-four years since the LCR was first promulgated. We now know that two of the most significant factors contributing to elevated lead levels in drinking water are physical disturbance of lead-containing pipes and deterioration of protective scales coating the interior of such pipes during prolonged disuse. While the Report mentions both issues in passing, it does not recommend robust actions to address these factors through revisions to the LCR. The gravity of the risk to public health from these two exposure factors warrants greater attention

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[120] Dissent at 8 (citing studies that document or otherwise bear on the inadequacy of CCR alone as a medium for communicating health risks. Among other reasons, CCR is not sufficiently urgent, repetitive, or targeted to those most at-risk).

[121] LCR WG Report at 28.

[122] *Id.* at 25.

Studies by EPA scientists have shown that physical disturbances in particular can cause acute spikes in lead levels, temporarily exposing consumers to dangerously high amounts of lead in their water even in areas deemed safe by current monitoring practices.[123] Any activity that physically disrupts an area in proximity to service lines can cause a physical disturbance, from PWS maintenance to roadwork to private construction. The difficulty inherent in addressing this issue is compounded by the fact that not only PWSs, but a variety of public and private actors outside the direct regulatory reach of the SDWA and LCR undertake activities that lead to such disturbances. To its credit, the Report recommends requiring PWSs to inform other utilities whose work might affect LSLs about how to both manage potential disturbances and communicate with residents of affected homes about risks and risk mitigation measures.[124] This is an important first step in addressing one of the most important contributors to lead contamination of drinking water, but much more needs to be done. We urge EPA to begin immediately exploring mandatory preventative and remedial measures to address physical disturbance in the LCR revisions, including expedited full LSL removal.

Similarly, advances in scientific understanding since 1991 have revealed that effective CCT requires regular flows of treated water to create and maintain the scale that forms a protective barrier between lead pipes and water destined for human consumption.[125] Periods of disuse, such as when a residence is unoccupied, can lead to deterioration of that protective scale. When use resumes, such as when new occupants move in, particles of the scale itself can break off and enter the water. Not only does this leave pipes with gaps in the protective barrier, it creates an acute risk of lead contamination because particles of the deteriorated scale may contain extremely high amounts of lead. This factor is of particular concern from an environmental justice perspective because, among other reasons, foreclosure-related vacancies are concentrated in neighborhoods with large Hispanic and Black populations.[126] The Report does not address this known risk.

As noted in the PE section above, it is imperative that consumers be informed of the dangers posed by physical disturbances and scale deterioration as well as steps they can take to protect themselves and their families. However, PE alone is not sufficient to address the danger posed by these two issues, which also highlight the necessity of removing all LSLs from water systems as quickly as possible, before an event triggers a sudden release of lead into drinking water. In the interim, EPA must take further action to address the threat posed by these issues

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[123] Del Toral, M. A. et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *ES&T* 47(16): 9300–9307.

[124] LCR WG Report at 18.

[125] Arnold, R., and M. Edwards. 2012. Electrochemical Reversal of Galvanic Pb:Cu Pipe Corrosion. *ES&T*46(20):10941-7.

[126] Matthew Hall, et al., Neighborhood Foreclosures, Racial/Ethnic Transitions, and Residential Segregation (2015), *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4479290/.

until all LSLs are removed from the nation's water systems, whether in through the revised LCR or some other regulatory mechanism. We therefore also urge EPA to explore mandatory preventative and remedial measures in the LCR revisions to address the particular risks to new occupants of long-vacant homes.

Environmental Justice

Gross disparities in the impact of lead-contaminated water along lines of income, race, and ethnicity persist nearly two and a half decades after the promulgation of the LCR. EPA acknowledged this when it made addressing environmental justice concerns an explicit goal of the LCR long-term revisions.[127] While the Report mentions "important questions of disparate impact and environmental justice," it fails to confront these questions in a manner commensurate to their gravity. In several instances its recommendations would even exacerbate these inequities. As noted above, the well-known consequences of partial LSL replacement fall heavily on those who cannot afford to pay to replace LSLs running under their property. More broadly, because lead contamination affects low-income, black, and Hispanic populations disproportionately, any weakening of LCR's treatment technique or failure to institute an effective LSL replacement program will be felt more acutely by these populations as well.

The "shared responsibility nature of the LCR"[128] is not an excuse to leave vulnerable individuals and communities to fend for themselves in the face of a weakened treatment technique and an aspirational LSL replacement regime with no mechanism for ensuring removal of all dangerous LSLs. The stakes are too high in light of the lifelong consequences of lead poisoning, especially for the young. The revised LCR must address the socioeconomic and racial inequities in lead contamination of water head-on.

CONCLUSION

The LCR Working Group Report contains many good and important suggestions to improve the LCR. It has significant shortcomings and omissions as well. A strength of the LCR long-term revisions process is the opportunity for due deliberation, and EPA should not accept the Report's recommendations without critical examination. As EPA considers the Report and NDWAC's recommendations and proceeds with revising the LCR, we urge that it keep the public health-protective purpose of the SDWA and the interests of environmental justice as the core driving factors in the LCR long-term revision process.

If you have any questions or would like to discuss this matter, please feel free to contact Jennifer C. Chavez at jchavez@earthjustice.org or 202-667-4500.

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[127] EPA, LCR Long-term Revisions White Paper, available at: http://water.epa.gov/drink/ndwac/upload/lcrwgmeetsumaxd32514.pdf (last visited 11/06/15).

[128] LCR WG Report at 19.

Sincerely,

Jennifer C. Chavez, Staff Attorney
Carter Hall, Law Fellow
Earthjustice

Lanny Roy
President
A Community Voice - Louisiana

Wade Rathke
ACORN International

Jane Williams
Executive Director
California Communities Against Toxics

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Cc: Gina McCarthy
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Matthew Tejada
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*Signatories and addressees updated on 1/18/16

Together We Can Protect Drinking Water

EPA NATIONAL DRINKING WATER ADVISORY COUNCIL

December 15, 2015

Ms. Gina McCarthy
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington D.C. 20460

Dear Administrator McCarthy:

On behalf of the National Drinking Water Advisory Council (NDWAC or Council) and with unanimous agreement, I am pleased to provide recommendations for the long term revisions to the Lead and Copper Rule (LCR). The eventual long term revisions to the LCR will be an important opportunity for removing sources of lead in contact with drinking water and thereby reducing exposure to lead from drinking water.

Recognizing that there is no safe blood lead level, revisions to the LCR alone are not sufficient to address this critical issue. A comprehensive shared responsibility exists between federal, state and local government, public and private utilities, and customers. With other partners, such as the Housing and Urban Development (HUD), the Environmental Protection Agency (EPA or Agency) should lead a comprehensive collaborative national effort to reduce lead in drinking water.

The removal of all lead service lines will require significant financial resources and time. During this time it is essential to have in place a robust effort of consumer education and engagement to assure ongoing protection from exposure to lead in drinking water. Also, prior to adoption of the new rule the highest level of compliance with the existing rule must occur.

Please know the Council valued and considered in our deliberations and recommendations all public comments and opinions received.

The following discussion provides historical context and the Council's overarching strategic thoughts about reducing lead in drinking water. Under the Safe Drinking Water Act (SDWA) EPA sets public health goals and enforceable standards for drinking water quality.[1] The LCR is a

[1] EPA establishes National Primary Drinking Water Regulation (NPDWRs) under SDWA. NPDWRs either establish a feasible Maximum Contaminant Level (MCL) or a treatment technique, "to prevent known or anticipated adverse effects on the health of persons to the extent feasible."

treatment technique rule. Instead of setting a maximum contaminant level (MCL) for lead or copper, the rule requires public water systems (PWSs) to take certain actions to minimize lead and copper in drinking water, to reduce water corrosivity, and prevent the leaching of these metals from the premise plumbing and drinking water distribution system components and when that isn't enough, to remove lead service lines.

The current rule sets an action level, or concentration, of 0.015 mg/L for lead and 1.3 mg/L for copper. An action level is not the same as an MCL. A MCL is based on health effects; whereas an action level is a screening tool for determining when certain treatment technique actions are needed. Because the LCR is a treatment technique rule, the action level is based on the practical feasibility of reducing lead through controlling corrosion. In the LCR, if the action level is exceeded in more than ten percent of tap water samples collected during any monitoring period (i.e., if the 90th percentile level is greater than the action level), it is not a violation, but triggers other requirements that include water quality parameter monitoring, corrosion control treatment (CCT), source water monitoring/treatment, public education, and lead service line replacement (LSLR).

In early 2004, EPA commenced review of the implementation of the LCR. EPA released a Drinking Water Lead Reduction Plan in 2005, which outlined short-term and long-term goals for improving implementation. In 2007, EPA promulgated regulations that addressed the short-term revisions to the LCR that were identified in the 2005 Plan. The Agency has continued to work on long term issues that required additional data collection, research, analysis and full stakeholder involvement – with the eventual goal of promulgating long term revisions.

Seeing the need for additional stakeholder input, EPA requested that the NDWAC form a Lead and Copper Rule Working Group to consider several key questions and issues. The members of the Working Group brought diverse perspectives and expertise in preparation of the report developed and submitted for the NDWAC's consideration. The Council appreciates the extensive hard work and dedication of the Working Group members over many months and numerous face-to-face meetings. The Council recognizes the Working Group's respectful consideration of varying and detailed opinions and technical information.

With the following enhancements and considerations, the Council forwards the report to you in its entirety (attached) and unanimously agrees with its recommendations. Please note that the full economic ramifications of these possible long term revisions are not yet quantified and accordingly were not a significant part of the Council's deliberations.

The Council considers these recommendations an integrated package, rather than a menu of choices from which some options can be selected and combined with others. This package reflects a concerted attempt to strengthen public health protection, which includes utilizing the multiple approaches and resources available to PWSs to achieve the greatest public health value, including proactively engaging residents in opportunities to improve drinking water through the removal of lead in water.

The Council considers that the driving proactive principle to improve public health protection is removing full lead service lines from contact with drinking water to the greatest degree possible and minimizing the risks of exposure to the remaining sources of lead in the meantime. In framing the revisions, priority should be given to sensitive populations (pregnant women, infants and children). Additionally, environmental justice concerns including low-income populations should be considered by all levels of government. Following significant discussion, the Council emphasizes that the PWSs "control" means "ownership".

The NDWAC supports the Working Group's report with the following enhancements:

- Creating a national clearinghouse of information for the public and templates for PWSs, tailoring the Consumer Confidence Report, immediately engaging the health community to understand contribution of water to overall exposure to lead, adding targeted outreach and remedies to consumers with lead service lines;
- Improving consumer confidence in drinking water;
- Requiring corrosion control re-evaluation if changes to source water or treatment are planned;
- Clarifying the expectations for small- and medium-systems not requiring CCT under the current rule;
- Closing the science gaps and providing guidance in sampling methodologies and techniques to ensure the samples provide the desired information;
- Considering alternate ways to demonstrate steady-pace improvement in LSLR in addition to percentage targets;
- Investigating the need for a maximum number of customer-requested samples, and establishing criteria for satisfying the minimum number of samples;
- Establishing a health-based, household action level that triggers a report to the consumer and to the applicable health agency for follow up;
- Separating the requirements for copper from those for lead and focusing new requirements where water is corrosive to copper; and
- Establishing appropriate compliance and enforcement mechanisms.

Although leadership by the Agency is essential, reduction of exposure to lead in drinking water cannot be achieved by EPA regulation alone. The attached report includes recommendations for renewed commitment, cooperation and effort by government at all levels and by the general public. We urge EPA to play a leadership role not only in the revisions to the LCR but also in educating, motivating, and supporting the work of other EPA offices; federal, state and local agencies and other stakeholders.

On behalf of NDWAC, thank you for the opportunity to provide these recommendations. We look forward to providing further assistance as EPA considers these important issues.

Sincerely,

Jill D. Jonas
Chair,
National Drinking Water Advisory Council

cc: Joel Beauvais, Acting Deputy Assistant Administrator, Office of Water
Peter Grevatt, Director, Office of Ground Water and Drinking Water

Enclosure

Clarifications Needed to Strengthen the Lead and Copper Rule Working Group's Recommendations for Long Term Revisions to the Federal Lead and Copper Rule

The August 24, 2015 final report from the National Drinking Water Advisory Council (NDWAC) Lead and Copper Rule Working Group (LCRWG) to the NDWAC presents a series of recommendations intended to improve the public health protection and implementation of the federal Lead and Copper Rule (LCR) through proactive lead service line (LSL) replacement programs, more robust public education requirements, stronger corrosion control treatment (CCT) requirements, and modified monitoring requirements. A proactive, consumer-centric approach to the EPA's upcoming revisions to the LCR is an excellent strategy for improving public health protection by reducing consumer exposure to lead in drinking water.

The following clarifications to those recommendations are needed, however, to ensure that the public health protections of the LCR are increased and not reduced (LCRWG recommendations in blue):

1. **Require proactive full LSL replacement programs** which set replacement goals, effectively engage customers in implementing those goals, and provide improved access to information about LSLs (in place of current requirements in which LSLs must be replaced only after a lead action level (LAL) exceedance).

This is an excellent strategy for improving public health protection under the LCR. However, a series of clear requirements and definitions are needed to ensure this strategy is clear, enforceable, and enacted as intended:

1.1 Require public water systems (PWSs) to develop an accurate inventory of lead service lines. Failure to complete is a violation.

1.2 Require PWSs to develop a full LSL replacement program, with details available online, including:

- A prioritization scheme that targets neighborhoods with LSLs, child care centers, and areas with highest blood lead levels; a financing strategy that guarantees private-side LSL replacement for low-income customers; and failure to implement the full LSL replacement program returns PWSs to compliance with the existing LCR

1.3 Provide an objectively measurable definition of a PWS's "meaningful" effort to work with homeowners; failure to comply with that definition is a violation.

1.4 Include an explicit ban on partial lead service line replacement.

2. **Establish more robust public education requirements for lead and LSLs,** by updating the Consumer Confidence Report (CCR), adding targeted outreach to consumers with lead service lines and other vulnerable populations (pregnant women and families with infants and young children), and increasing the information available to the public.

Public education is a critical component of the LCR to allow customers to protect themselves from lead exposure. The following recommendations are provided to ensure that customers receive the information they need from their PWS to protect themselves from lead in water:

2.1 Require notification of the presence of LSLs to homes with LSLs, to both residents and home buyers; consumers must have information to take decisive actions to protect themselves from lead

2.2 Public education materials must include the following information:

- Clear information on the health harm associated with exposures to lead in water of fetuses, infants, and small children
- The consumer must take appropriate precautions to prevent harmful exposures
- In cases where a blood lead level or household action level is exceeded, consumers have a right to a comprehensive assessment of lead sources

2.3 Make publicly available all lead-related information for the PWS, including all tap-sampling results and dates of collection, documentation of LSLs, sampling pools, sampling protocols, CCT, full disclosure of invalidated samples and reasons for invalidation

2.4 Use consumer-centered risk communication best practices. All communications must be proactively public-health focused, and the goal of risk communication should not be to diffuse public health concerns.

2.5 Public education under the LCR should build in the participation of citizens and stakeholders, specifically from low-income neighborhoods, neighborhoods with high concentration of LSLs, and parent groups.

3. **Revise the CCT guidance manual**, provide regular updates, and provide increased expert assistance on CCT to PWSs and primacy agencies. The LCR should continue to require re-evaluation of CCT during a change in treatment or source water and WQP monitoring.

The effectiveness of CCT is very closely tied to monitoring requirements at customer taps, and therefore must rely on a robust lead-in-water monitoring strategy. The following provisions must be in place for the strengthened CCT requirements to realize their full potential:

3.1 There must be an ongoing feedback loop between increased monitoring for WQPs and lead-in-water levels at homes. Research indicates that while WQPs remain unchanged at the treatment plant, lead concentrations can be changing at customers taps.

3.2 Create a trigger for a mandated comprehensive evaluation of all the factors that contributed to a LAL exceedance, establish mandated corrective actions, and develop a corrective actions tool box.

3.3 Provide regulatory language specifying the scope of the consultation required between the PWS and the state when considering source water and treatment changes.

4. Modifying monitoring requirements: A completely new strategy for tap monitoring relying on voluntary customer-initiated tap water sampling has been proposed.

This strategy will substantially weaken the connection between CCT and lead in tap samples, and will make any kind of long-term trend analysis practically impossible considering the LCRWG suggestion that different sampling protocols might be used based on household preference. Because PWSs cannot afford to conduct monitoring everywhere, it is imperative to monitor in the worst-case locations to protect public health. **Rather than adopt LCRWG voluntary monitoring strategy, strengthen the existing requirements with the following:**

4.1 Ensure that all PWSs conduct proper lead-in-water monitoring targeting highest-risk homes as follows:

- Sampling at high-risk homes identified through the required LSL inventory; prohibit any variations on EPA recommendations for sampling protocols, including pre-flushing, aerator removal, and capping stagnation time; ban invalidation of proper samples

4.2 Define and mandate a single sampling protocol for PWS with no LSLs and one sampling protocol for PWS with LSLs, which includes a second draw sample. All other protocols are prohibited. Sample collection should reflect how water is normally used in homes (full flow, large mouth bottles).

4.3 For outlier household lead levels, create a follow-up sampling requirement (similar to monitoring required after a total coliform positive) to immediately investigate the cause of the high level and potential extent of lead exposure indicated by the outlier, with associated violations for failure to monitor.

For more information contact Elin Betanzo, Senior Policy Analyst, at ebetanzo@nemw.org

Clarifications Needed to Strengthen the Lead and Copper Rule Working Group's Recommendations for Long Term Revisions to the Federal Lead and Copper Rule

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The following clarifications to those recommendations are needed, however, to ensure that the public health protections of the LCR are increased and not reduced (LCRWG recommendations in blue):

1. **Require proactive full LSL replacement programs** which set replacement goals, effectively engage customers in implementing those goals, and provide improved access to information about LSLs (in place of current requirements in which LSLs must be replaced only after a lead action level (LAL) exceedance).

This is an excellent strategy for improving public health protection under the LCR. However, a series of clear requirements and definitions are needed to ensure this strategy is clear, enforceable, and enacted as intended:

1.1 Require public water systems (PWSs) to develop an accurate inventory of lead service lines. Failure to complete is a violation.

1.2 Require PWSs to develop a full LSL replacement program, with details available online, including:

- A prioritization scheme that targets neighborhoods with LSLs, child care centers, and areas with highest blood lead levels; a financing strategy that guarantees private-side LSL replacement for low-income customers; and failure to implement the full LSL replacement program returns PWSs to compliance with the existing LCR

1.3 Provide an objectively measurable definition of a PWS's "meaningful" effort to work with homeowners; failure to comply with that definition is a violation.

1.4 Include an explicit ban on partial lead service line replacement.

2. **Establish more robust public education requirements for lead and LSLs,** by updating the Consumer Confidence Report (CCR), adding targeted outreach to consumers with lead service lines and other vulnerable populations (pregnant women and families with infants and young children), and increasing the information available to the public.

Public education is a critical component of the LCR to allow customers to protect themselves from lead exposure. The following recommendations are provided to ensure that customers receive the information they need from their PWS to protect themselves from lead in water:

2.1 Require notification of the presence of LSLs to homes with LSLs, to both residents and home buyers; consumers must have information to take decisive actions to protect themselves from lead

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2.3 Make publicly available all lead-related information for the PWS, including all tap-sampling results and dates of collection, documentation of LSLs, sampling pools, sampling protocols, CCT, full disclosure of invalidated samples and reasons for invalidation

2.4 Use consumer-centered risk communication best practices. All communications must be proactively public-health focused, and the goal of risk communication should not be to diffuse public health concerns.

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3. **Revise the CCT guidance manual**, provide regular updates, and provide increased expert assistance on CCT to PWSs and primacy agencies. The LCR should continue to require re-evaluation of CCT during a change in treatment or source water and WQP monitoring.

The effectiveness of CCT is very closely tied to monitoring requirements at customer taps, and therefore must rely on a robust lead-in-water monitoring strategy. The following provisions must be in place for the strengthened CCT requirements to realize their full potential:

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3.2 Create a trigger for a mandated comprehensive evaluation of all the factors that contributed to a LAL exceedance, establish mandated corrective actions, and develop a corrective actions tool box.

3.3 Provide regulatory language specifying the scope of the consultation required between the PWS and the state when considering source water and treatment changes.

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4.3 For outlier household lead levels, create a follow-up sampling requirement (similar to monitoring required after a total coliform positive) to immediately investigate the cause of the high level and potential extent of lead exposure indicated by the outlier, with associated violations for failure to monitor.

For more information contact Elin Betanzo, Senior Policy Analyst, at ebetanzo@nemw.org

REAL ID

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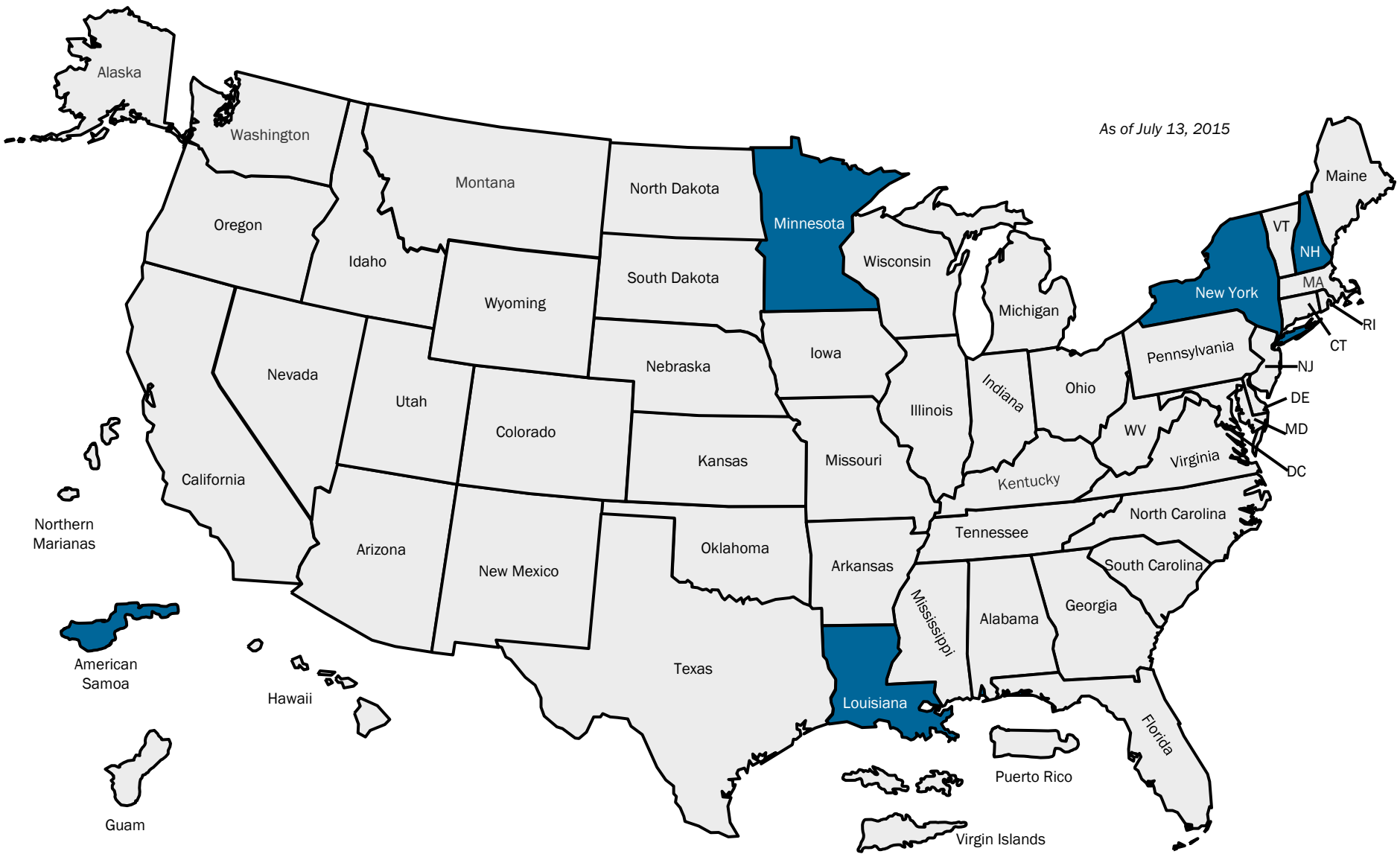

If the state of residence is marked in blue, you will need to present a form of acceptable ID other than a driver's license or state-issued identification card to access this facility.

The list of jurisdictions subject to enforcement changes over time. For the most recent list, please visit http://www.dhs.gov/secure-drivers-licenses#1.

Homeland Security

Department of Homeland Security Office of Policy
www.dhs.gov/secure-drivers-licenses

parents for nontoxic alternatives

October 28, 2015

To: The EPA National Drinking Water Advisory Council (NDWAC)
Re: Long-term revisions for the Lead and Copper Rule (LCR)

Dear Chair Jonas and members of the Council:

As a dissenting member of the Environmental Protection Agency (EPA) National Drinking Water Advisory Council (NDWAC) Lead and Copper Rule (LCR) working group, I herewith submit to NDWAC and to the official EPA record, my statement of dissent to the August 2015 "Report of the Lead and Copper Rule Working Group To the National Drinking Water Advisory Council."

I share fully the working group's commitment to a revised LCR that maximizes the protection of public health. I also commend the working group for its bold and innovative idea of building a brand new rule that is based on proactive, rather than reactive, full lead service line (LSL) replacement. As I mention in my statement, I see this as a step in the right direction. Unfortunately, however, my extensive experience with lead in drinking water in Washington, DC and nationally, has led me to believe that the working group's specific recommendations for how to implement a forward-thinking LCR would leave consumers less protected from exposures to lead in drinking water than would a revised version of the current rule that closes its well-known loopholes.

Mirroring the structure of the working group's report, I explain my reasoning in the pages that follow under these four sections:

I. Proactive Full LSL Replacement
II. Public Education for Lead and Lead Service Lines
III. Improved Corrosion Control Treatment
IV. Monitoring Requirements

I would also like to highlight the following three points, in case they prove useful to NDWAC's deliberations:

- It is sometimes assumed that a concerted effort to protect consumers from lead in drinking water is now necessary solely because science has shown that even small exposures to lead can cause significant health harm, and the Centers for Disease Control and Prevention (CDC) recently lowered its 10 micrograms per deciliter "blood lead level of concern" to a 5 micrograms per deciliter "reference level." Although these developments are true, they make for a very incomplete justification for the need to strengthen the LCR at this time. Since the LCR was promulgated, almost 25 years ago, we have gained a more complete scientific understanding of lead corrosion and corrosion control than we had in the early 1990s,

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including a far better understanding about the forms, sources, and prevalence of lead in drinking water; the multiplicity of factors that can worsen lead corrosion, including galvanic corrosion and physical disturbances of LSLs; the erratic, unpredictable, and difficult-to-detect release of lead particles; and the small- and large-scale public health harm that can result from inadequate or inappropriate applications of the current LCR. This information – coupled with insights from a) significant lead-in-water contamination events in cities like Washington, DC; Durham, NC; Greenville, NC; Providence, RI; and Flint, MI; and b) individual PWSs' questionable implementation of the LCR – has revealed that *lead in drinking water poses a serious, misunderstood, under-detected, and inadequately controlled health risk to consumers across the US. As such, revisions to address significant deficiencies and strengthen the rule are imperative.*

- Today we know that all US homes with lead-bearing plumbing materials face a risk of high lead in water, whether the PWS that serves them meets the LCR lead action level (LAL) or not. However, consumers in homes with LSLs (or homes that used to have LSLs) are *especially* vulnerable to long-term exposures, sometimes due to conditions that are extremely common and that are not controllable even with the best corrosion control treatment in place (e.g., physical disturbances of LSLs, prolonged periods of no water use resulting from lack of occupancy and followed by re-occupancy, or routine low water use). These conditions can cause disintegration of lead-bearing scales within pipes, which can in turn dislodge and pose an immediate and acute health risk to consumers analogous to lead paint exposure. It, therefore, seems advisable that NDWAC and EPA explore actions that can be taken by PWSs as soon as possible, and certainly before the final approval of the LCR long-term revisions, to alert the public to this exposure risk and offer guidance on appropriate health-protective measures.

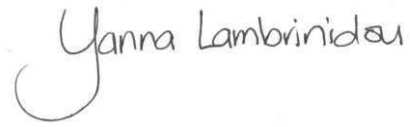
- There is no doubt that the LCR is a uniquely taxing rule for regulated PWSs and the public alike, as it places responsibility on both to minimize consumer exposures to lead at the tap. We also know that the points of contact between PWSs and consumers in relation to the LCR can at times be challenging. The WG's report to NDWAC alone, for example, makes reference to consumers who refuse to participate in LCR-compliance tap sampling, or sample their water improperly, or decline their PWS access to their property for full LSL replacement. As complex as these challenges – and others that I heard during the NDWAC LCR WG's deliberations – might be, I worry about the unexamined assumptions they can foster among PWSs, EPA, States, and even NGOs regarding who "consumers" are, what they understand, what they care about, and how they react. Specifically, I worry that these assumptions create room for unsubstantiated and obfuscating generalizations that overlook a) weaknesses in the LCR which leave consumers routinely uninformed and unprotected from preventable exposures to lead in water, b) PWS misinterpretations or misapplications of the rule that generate false assurances of safety and, when problems are uncovered, betray the public's trust, and c) extensively documented cases of consumers in jurisdictions that underwent significant lead-in-water contamination events, going to great lengths to understand the health risks of lead in water and the workings of the LCR, as well as to research, demand, and support scientifically-sound public-health-protective solutions (for more information see my dissenting statement).

> Because the LCR is a "shared responsibility" rule that presumes collaboration, coordination, and trust between PWSs and consumers, I believe it is extremely important that those of us who have the privilege to participate in policy-revisions deliberations stay alert to, and question, the climate of condescension and disrespect that can sometimes surface in connection to the very people that the LCR is intended to protect. I believe strongly that our ability to envision a closer and more transparent partnership between PWSs and the communities they serve will be necessary for developing revisions that make the LCR a better rule for all involved.

As I submit this statement of dissent, I declare that I have no conflicts of interest – financial, personal, or professional – and that all my work with, and for, the EPA NDWAC LCR WG was carried out as a volunteer.

Should you have any questions, please do not hesitate to contact me.

Sincerely,



Yanna Lambrinidou, PhD
President

STATEMENT OF DISSENT

from the Report of the Lead and Copper Rule Working Group
to the EPA National Drinking Water Advisory Council

I. PROACTIVE FULL LSL REPLACEMENT

Today we know that lead service lines (LSLs) and partially replaced LSLs pose a serious and permanent risk to human health, whether or not:

1. A public water system (PWS) meets the Lead and Copper Rule (LCR) lead action level (LAL), or
2. A one-time test of water sitting in a LSL (or a partially replaced LSL) reveals non-detect or low lead-in-water levels.

For this reason, the National Drinking Water Advisory Council (NDWAC) LCR working group's (WG's) recommendation for a mandated proactive full LSL replacement program is a step in the right direction. It also supports the WG's principle that under the revised LCR, resources and actions ought to maximize the protection of public health. Few would dispute that when it comes to lead in water, complete removal of LSLs would constitute one of the most public-health-protective actions possible. It would also result in significant long-term cost and environmental benefits since the amount of phosphate-based corrosion control required would be much lower on a permanent basis than if the LSLs remain in service. This conclusion seems more obvious and pressing today than at any other time, as current understanding about the risks of partial LSL replacement suggests strongly that the practice of removing only a portion of a LSL is not prudent from either a public health or financial standpoint.

However, the specifics of the WG's recommendation allow PWSs to delay full LSL replacement for decades, if not indefinitely, as well as to continue conducting partial LSL replacements, despite an extensive body of scientific research demonstrating that, under at least some circumstances, these replacements can pose a significant short- and long-term public health risk to consumers.[1]

For background, it is important to highlight that:

[1] Britton, A. and Richards, W.N., 1981. Factors Influencing Plumbosolvency in Scotland. *Journal of the Institute for Water Engineers and Scientists* 35(5):349-364; Cartier, C. et al. 2013. Impact of Treatment on Pb Release from Full and Partially Replaced Harvested Lead Service Lines (LSLs). *Water Research* 47(2):661-71; Cartier, C. et al. 2012. Effect of Flow Rate and Lead/Copper Pipe Sequence on Lead Release from Service Lines. *Water Research* 46(13):4142-52; St. Clair, J. et al. 2013. Long-term Behavior of Partially Replaced Lead Service Lines. Oral Presentation at CaNv-AWWA 2013 Inorganic Contaminants Symposium. Sacramento, CA; Hu, J. et al. 2012, Copper-Induced Metal Release from Lead Pipe into Drinking Water. *Corrosion* 68(11):1037-1048; Wang, Y. et al. 2013. Effect of Connection Methods on Lead Release from Galvanic Corrosion. *JAWWA* 105(7): E337-E351; Triantafyllidou, S. and M. Edwards 2011, Galvanic Corrosion after Simulated Small-Scale Partial Lead Service Line Replacements. *JAWWA* 103(9):85-99.

1. The LCR's lead-in-water monitoring requirement is intended to capture worst-case lead-in-water levels in highest-risk homes.[2]

2. The LCR's LSL replacement requirement is intended to function as a *remedial* measure that reduces or eliminates lead released from LSLs when corrosion control treatment (CCT) proves inadequate.

3. ***According to a recent industry-funded study, if the sampling protocol used for LCR compliance purposes were designed to capture worst-case lead from LSLs, it is estimated that approximately 70% of PWSs with LSLs would exceed the LAL.[3] This means that today, in the majority of PWSs with LSLs, LSL homes face a lead-in-water problem severe enough to, under the 25-year-old LCR LAL, trigger remedial requirements (i.e., source water monitoring, optimization or possible re-optimization of CCT, public education, LSL replacement). Such requirements are not triggered today only because the sampling protocol used for LCR compliance purposes is no longer fit for capturing worst-case lead levels in LSL homes.[4] Moreover, the pre-flushing employed by many PWSs is designed to actually miss worst-case LSL lead.***

If the current LCR were revised to reflect current scientific understanding about how to a) capture worst-case lead-in-water levels in LSL homes, and b) ensure that the LCR's LSL replacement requirement constitutes a remedy and not a heightened risk to human health:

- The sampling protocol for LCR compliance purposes would be revised to target, and capture health risks from, LSL water, and
- Partial LSL replacement would be banned for both LCR-mandated "involuntary" replacements and PWS-imposed "voluntary" replacements (see also the *American Academy of Pediatrics* and *Centers for Disease Control and Prevention* 2011 calls for a moratorium on this replacement).

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[2] The LCR states clearly that, "Targeting monitoring to worst-case conditions will help systems and States evaluate the reductions in contaminant levels achieved through treatment and determine when 'optimal' treatment is being maintained to the degree most protective of public health" (Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26514).

[3] Slabaugh, R. 2014. Optimized Corrosion Control—An Estimate of National Impact (Power Point presentation). AWWA Water Quality Technology Conference (WQTC), New Orleans, LA, Nov. 16-20.

[4] The sampling protocol used for LCR compliance purposes was designed to capture primarily interior sources of lead (i.e., lead-containing solder and lead-containing brass) as well as some LSL water. Today, however, interior sources of lead have diminished because they contain a relatively limited mass of lead, and because many premise plumbing components have been replaced with components that contain lower levels of lead, especially in the pre-1986 sampling pool of residences (see Triantafyllidou & Edwards 2012, Table 1 and discussion). On the other hand LSLs, which are 100% lead by weight, pose an *increased* risk to human health for many reasons (e.g., lead scale accumulates with time and can increasingly crack and flake with age, water conservation practices lengthen the contact time between water and LSLs, and the water in many PWSs is more corrosive due to higher chloride, the presence of chloramine, and the absence of chlorine) (see Marc Edwards' 2014 webinar talk to the NDWAC LCR WG). In other words, today LSLs pose a far greater risk to human health relative to any other lead-bearing plumbing material in a PWS's distribution system, and this disparity is likely to increase with time.

The NDWAC LCR WG's proactive LSL replacement recommendation includes neither of the above changes. Instead it proposes a dramatic departure from the LCR's current framework that:

- Ensures that PWSs with LSLs continue to conduct 90th percentile calculations based on tap samples that do not capture worst-case lead-in-water levels in LSL homes and, therefore, can continue to claim that they meet the LAL and can continue to not optimize (or re-optimize) their CCT, even when LSL homes dispense very high levels of lead and place consumers at significant health risk.

- Promotes the development of proactive full LSL replacement programs by all PWSs with LSLs that would trigger violations only when a PWS fails to conduct "meaningful" outreach to homeowners, and not when it fails to meet set goals of actually replacing LSLs.

- Is accompanied by a sorely anemic public education requirement (i.e., outreach to consumers in LSL homes "at least every three years" and when a new customer moves in), which ignores that today consumers in LSL homes are at daily risk of exposure to high levels of lead in their water and are, therefore, in need of *urgent* and *frequent* messaging about what they can do to protect themselves.

If implemented, this recommendation leaves room for long-term and indefinite delays of full LSL replacement. In fact, it makes such delays highly likely. Proactive full LSL replacement will be taxing for many PWSs in terms of needed time, resources, diverse and potentially escalating interventions, and coordination with multiple parties for years and decades to come, *even under the most favorable conditions* (i.e., with all the necessary funding, resources, and support in place). Adding to this burden PWS-specific limitations and obstacles that will most certainly arise in many, if not most, jurisdictions makes such a demanding initiative not "less" challenging than the LCR's current LSL replacement requirement, but challenging in a different way. For some PWSs the program might prove practically impossible, while for others it might take 2, and 5, and 8, if not more, decades to complete.

In fact, it may not be coincidental that the WG's recommendation to grant PWSs credit toward their full LSL replacement goals when they can demonstrate that a home with a presumed LSL does not actually have such a line, bears disturbing resemblance to the current LCR's "test-out" provision.[5] "Testing out" allows PWSs today to count a LSL that tests under the LAL in a one-time 1st-liter sample as "replaced" and to meet LCR LSL replacement requirements faster and with minimized expense while leaving the lead risk to many consumers unmitigated.

Significant and even indefinite delays under a regulatory scheme that does not render actual LSL replacement mandatory not only seem inevitable but would also risk:

[5] Nakamura, D. 2004.

1. **Not achieving the recommendation's intent of full LSL removal**
2. **Continuing to leave new generations of consumers in LSL homes inadequately protected from lead in water for years and decades to come, if not centuries, even while PWSs claim the water meets federal safety standards**
3. **Allowing PWSs with LSLs and suboptimal CCT to continue to use such CCT for years and decades to come, if not indefinitely.**

Comparing the WG's proactive full LSL replacement recommendation (which I will refer to as the "proposed LSL replacement program") with the current LSL replacement requirement, *if the latter were updated to reflect current scientific knowledge* (which I will refer to as the "existing LSL replacement program (without holes or loopholes)"),[6] it seems that the proposed LSL replacement program would provide stronger public health protection only under the following conditions:

- If the revised LCR mandated that PWSs *develop*, *obtain state approval for*, and *make transparent and easily accessible on the PWS's website* a full LSL replacement program, which would include:

  → Independently verified information about the PWS's legal authority to carry out replacement of plumbing materials (or hazardous plumbing materials) in private space (see original definition of "control" in LCR of 1991)
  → A prioritization scheme that targets for full LSL replacement neighborhoods with known or suspected LSLs, child care centers, areas with the highest blood lead levels (BLLs), and neighborhoods with homes that have been unoccupied for an extended period of time (the length of this period to be defined by EPA)
  → A financing scheme that makes private-side LSL replacement guaranteed for low-income customers.

  Such a requirement would help ensure that PWSs do indeed develop LSL replacement programs, that they use all available legal authority to carry out full LSL replacements, that they are accountable for following through with implementation, and that they implement these programs in such a way as to protect the most vulnerable populations first. Failure to achieve these objectives would trigger a violation or would return the PWS to the existing LSL replacement program (without holes or loopholes).

- If the revised LCR mandated frequent delivery of clear and urgent messaging to consumers in all homes presumed to have LSLs about the risk they face from exposure to high levels of lead in their water and steps they can take to prevent exposure.

[6] Such an update would include a compliance sampling protocol that captures LSL lead in LSL homes and a ban on partial LSL replacement.

- If the revised LCR included a *clear, concrete, and objectively measureable definition* of a PWS's "meaningful" effort to work with homeowners.[7] Such a definition would help prevent PWSs from unfairly blaming homeowners for refusing private side LSL replacement, when the circumstances are such that homeowners are not adequately informed about the risks of lead in water or the benefits of full LSL replacement, have no capacity to cover the cost of the replacement, or are under the false impression that their water is safe because a one-time test showed lead levels below 15 ppb. Only when there is quantifiable evidence that a PWS has made "meaningful" progress as measured by clear, concrete, and objectively measurable criteria, and this evidence is easily accessible to the public, should failure to comply with the new provisions not trigger a violation or not return the PWS to the existing LSL replacement program (without holes or loopholes).

- If the revised LCR granted PWSs credit toward their full LSL replacement goals *only* for every full LSL replacement they actually conducted, and not for demonstrating that a home with a presumed LSL did not in fact have such a line. This would help prevent a loophole similar to the current "test-out" provision whereby PWSs would be able to devote extensive amounts of time establishing the lack of LSLs in neighborhoods that they have good reason to believe have few, if any, such lines, while at the same time delaying the implementation of actual full LSL replacement in neighborhoods that they have good reason to believe have a high concentration of LSLs. A loophole such as this may also create a perverse incentive for PWSs to characterize as "lead-free" service lines with sections or components of unknown or ambiguous composition.

- If the revised LCR included clear criteria that PWSs would need to meet to declare a service line free of lead (i.e., free of any lead pipe portions as well lead pigtails, goosenecks, or other lead-bearing fittings), and required that records on each home were made publicly available on the PWS's website and contained information on:

    → All the materials present between the water main and the entry into the home (e.g., connectors between the water main and the service line, portion of service line up to the meter, portion of service line from the meter to the exterior wall of the residence, portion of service line from the exterior wall into the home, etc.)

    → The methods and dates by which these materials were confirmed.

[7] I recommend strongly that such a definition be developed with input from homeowners who have personal experience with the LCR's LSL replacement requirement. PWSs have a history of blaming homeowners for refusing private side LSL replacement, shifting claims of LSL "ownership" when it suits them, and not adequately informing consumers about the risks of lead in water or the benefits of full LSL replacement. They also have a history of making full LSL replacement inaccessible to low-income homeowners and failing to disabuse consumers from the false impression that their LSL poses no health risk because a one-time test showed lead levels below 15 ppb.

- If the revised LCR banned partial LSL replacement – a practice that can increase consumer risk of exposure to lead – and required PWSs that own or "control"[8] LSLs on private property to conduct and cover the cost of full LSL replacements during emergency repairs and water main work.

Short of the above conditions, the proposed LSL replacement program is likely to provide weaker public health protection than the existing LSL replacement program (without holes or loopholes), potentially causing significant health harm to many new generations of fetuses, infants, and young children and raising serious environmental justice questions and concerns.

II. PUBLIC EDUCATION FOR LEAD AND LSLS

In light of the fact that:

1. There is no safe level of lead in water
2. The LCR allows for:
    - 100% of homes sampled for LCR compliance to dispense any concentration of lead between 1-15 ppb
    - 10% of homes sampled for LCR compliance to dispense any concentration of lead whatsoever
3. The LCR allows PWSs exceeding the LAL to take up to 60 days to inform consumers about widespread contamination,

the LCR's compliance mechanism grants no individual consumer protection from chronic and acute exposures to lead in drinking water. In other words, under the LCR, consumers who want to be sure that the water they drink and cook with does not place them and their families at significant health risk from lead, are on their own to take precautionary measures. This means that public education about lead in water and the limitations of the LCR, including the limitations of CCT and one-time sampling, is vital for proper consumer action and, ultimately, for effective public health protection. Strong public outreach is urgent in all PWSs and even more so in PWSs with LSLs, most of which would exceed the LAL today if they sampled LSL water.

In light of the fact that today the vast majority of consumers are not aware that they are personally responsible for protecting themselves from lead in water, I concur with the NDWAC LCR WG's conclusion that a) a more robust public education requirement is needed, b) this requirement must be based on principles of consumer-centered risk communication, and c) to design this requirement, EPA ought to consult a diverse group of experts with strong representation from consumers who have been directly affected by lead in water and the LCR.

Since at the present time we do not know if EPA will convene such a group of experts, and since the NDWAC LCR WG's recommendation goes further to make concrete suggestions for a revised public education requirement, I consider it my

[8] Based on the LCR 1991 definition of this term, which does not necessitate that the PWS pay for the private side replacement of the LSL.

obligation to highlight what I perceive as a key deficiency in the WG's conceptualization of public education:

Today we know that all US homes with lead-bearing plumbing components face a risk of high lead in water, whether the PWS that serves them meets the LCR LAL or not. We must, after all, keep in mind that even with the most effective CCT possible and a successful proactive full LSL replacement program there are many *ordinary* conditions that can accelerate lead release (e.g., aging LSLs and lead-bearing solder, increase in water temperature, water conservation plumbing devices and practices, etc.). Consumers in homes with LSLs (or homes that used to have LSLs) are *especially* vulnerable to chronic and acute exposures to lead in water due to:

- Physical disturbances of LSLs (or pipes, such as galvanized iron, that have "absorbed" lead from such lines) caused by water- and non-water-related utility work.[9] In most jurisdictions such work takes place daily and can dislodge and release scale and sediment, which can contain excessively high levels of lead.

- Prolonged periods of no water use resulting from lack of occupancy. When unoccupied homes are subsequently re-occupied, they can pose an immediate and acute health risk to incoming residents due to the disintegration of lead-bearing scales and sediment in LSLs (or in pipes that have "absorbed" lead from such lines). The same type of disintegration can occur in homes with routine low water usage.[10]

For these reasons, effective public education ought to result in a change in consumers' *daily* water use practices that can minimize lead exposures at all times. This can be achieved through increased public understanding about the prevalence of lead in water, conditions that favor its release, the unpredictability of its release, health risks from ingestion, and steps to prevent exposure. **In other words, the LCR's public education requirement must aim at heightening consumer awareness about lead in water to the level that the current LCR tries to achieve following a LAL exceedance.[11]**

We must not forget that currently, comprehensive public education is mandated not because levels of lead in any individual home exceed zero ppb (the only concentration known to pose no risk to human health), but because over 10% of samples from targeted taps exceed the 25-year-old, non-public-health-protective LAL. This means that by the time comprehensive education is mandated, many consumers have been needlessly exposed to elevated levels of lead for prolonged

[9] Del Toral, M. A. et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *ES&T* 47(16): 9300–9307.
[10] Arnold, R., and M. Edwards. 2012. Electrochemical Reversal of Galvanic Pb:Cu Pipe Corrosion. *ES&T* 46(20):10941-7.
[11] Evidence suggests that the current LCR public education requirement for PWSs that exceed the LAL is not effective at changing consumer behavior. I mention it as an example of intent (i.e., to achieve long-term behavior change) rather than effectiveness (Griffin and Dunwoody 2000; Melissa Essex Elliot's 2014 webinar presentation to the NDWAC LCR WG).

periods of time. A further weakness (if not absurdity) in the rule's public education provision is that any given level of lead above the LAL in any given home may at one time fail to trigger the LCR's public education requirement and at another time succeed in doing so only because the contamination is found to be widespread. The inconsistency, therefore, between a) the only level of lead in water known to pose no risk to human health, b) actual levels of lead at consumer taps which often exceed zero ppb, and c) the LCR's "over 10%" prevalence criterion that triggers comprehensive public education only after harm has been done, highlights the need for ***a revised public education requirement that is proactively public-health-focused rather than reactively emergency-remediation-focused.***

To begin to visualize such a requirement, which similarly to public messaging about tobacco, alcohol, and drugs, would stress the increased vulnerability of fetuses, infants, and small children, it seems quite clear that we must first break out of outdated ways of thinking about public education. Consumer-centered risk communication best practices teach us two important lessons:

1. Information-heavy, long, non-personal, and non-actionable outreach messages delivered unidirectionally through a single channel of communication are ineffective.[12] Several studies have already documented the severe limitations of Consumer Confidence Reports (CCRs), while others have concluded that face-to-face communication as well as regular outreach and outreach through local grassroots organizations are far more successful at delivering desired messaging than written materials.[13,14]

2. For risk communication to achieve its intended goals, the public must be accepted and involved as a legitimate partner. According to the first of EPA's "Seven Cardinal Rules of Risk Communication," "First, people and communities have a right to participate in decisions that affect their lives, their property, and the things they value. Second, the goal of risk communication should not be to diffuse public concerns or avoid action. The goal should be to produce an informed public that is involved, interested, reasonable, thoughtful, solution-oriented, and collaborative."[15]

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[12] See Melissa Essex Elliot's 2014 webinar presentation to the NDWAC LCR WG.
[13] Griffin and Dunwoody 2000; Meyer-Emerick 2004; Morrone et al. 2005; AWWA 2005; Blette 2008; Roy et al. 2015; Summary of Interviews Conducted Regarding WASA's Public Education on Lead in Water.
[14] EPA's own guidelines for effective risk communication stress that messaging must explain clearly "the situation, the risks, and the remedies" ("Risk Communication in Action," pp. 12 and 17). The NDWAC LCR WG's proposed CCR language fails to tell readers what the likelihood of lead in their water is, or what they can do to protect fetuses, infants, and young children from exposure. At the same time, without information about *how* to determine if they have lead-bearing plumbing, the text advises consumers with such plumbing to have their water tested *if they wish*. This message fails to convey the simple fact that if lead-bearing plumbing exists a) consumers are at risk of exposure, b) a one-time test may be misleading, and c) precautions in homes with pregnant women, infants, and young children are extremely important at all times. Another prime example of PWS-centered public education is the CCR's lead-in-water table, which keeps consumers in the dark about the actual risks to their health, even when the LAL is met. Today, the vast majority of consumers do not know what the LCR monitoring requirement is or what "ppb," "MCLG," "LAL," and "90th percentile" mean. When consumers lack this information, they are unable to make sense of the data provided and assess a) the significance of 90th percentile values above or below the LAL, and b) what potential health risks from lead in water they might personally face.
[15] The EPA's Cardinal Rules of Risk Communication.

I am concerned that the specific suggestions in the NDWAC LCR WG's recommendation ignore these lessons, replicating the existing, ineffective scheme of public education that largely serves the interests of PWSs. Although such a scheme would allow PWSs to expediently "check the box" of regulatory compliance, it would also continue to leave consumers sub-optimally informed and ultimately unsupported in adopting new water-use practices for effective lead-exposure prevention. Specifically, all of the WG's recommendations involve unidirectional, written communications that are a) likely to be accessed only by consumers who are already sensitized to the problem of lead in water (e.g., National Clearinghouse), b) delivered as part of other, non-lead related informational packets and thus likely to receive diluted, if any, attention (e.g., CCR, letter to new customers), and c) delivered extremely infrequently (i.e., when a consumer becomes a new PWS customer, annually in the case of CCRs,[16] and approximately once every 3 years in the case of letters to residents in homes with LSLs). Additionally, the WG's recommendations include no call for mandatory outreach to caregivers and healthcare providers of vulnerable populations or low-income communities, and no partnerships between PWSs and consumers.

The compelling argument that the WG makes in support of a proactive full LSL replacement program – namely, that the LCR's LSL replacement requirement would be more effective if it were triggered under non-emergency conditions – is apt for public education as well. Proactive (and thus *non-crisis*) public education about lead in water that involves a) multiple channels of communication, b) regular frequency of messaging, and c) long-term partnerships with governmental, non-governmental, and local grassroots organizations devoted to children's health or to the welfare of low-income communities, with schools and daycare centers, as well as with community leaders and parent-to-be/parent groups, seems not only compliant with risk communication best practices but also imperative in the specific context of lead in drinking water and the LCR.[17] Such a requirement, which would intensify following a LAL (or "System Action Level") exceedance, could mandate that PWSs:

1. Develop, update, and post online a comprehensive database of local stakeholders
2. Create a taskforce that draws from this database and places heavy emphasis on broad representation from low-income neighborhoods, neighborhoods with a high concentration of LSLs, and parent-to-be/parent groups
3. In partnership with such a taskforce, develop a locally-appropriate, long-term, and multimedia public education program that meets well-defined EPA requirements

[16] In the case of the CCR, it must be noted that a) as more consumers sign up to have their water bills paid automatically and thus have less of an incentive to read regular mail from their water utility, and b) as more water utilities mail only a 1-page version of the CCR and leave it up to consumers to access the full version electronically, the number of consumers who will actually read the CCR is likely to drop further.

[17] The imperative of bidirectional communication in government messaging about environmental health is discussed extensively in the 2010 Education & Communication Working Group Report that was developed as part of the ATSDR/CDC "National Conversation" initiative. EPA's 1990 guidance for developing effective community-based public education programs is also still relevant and a very useful resource ("A Primer: Developing a Community-Based Public Education Program on Lead in Drinking Water").

4. Hold at least one annual meeting with all stakeholders, including any other interested members of the public and PWS staff, to go over such matters as the mechanics of lead in water, health risks of exposure, the LCR, key messaging for consumers, and the like, and generate new ideas for improved community outreach and involvement.

First and foremost, however, attention must be paid to the content of public education. Consumers have a right to *clear*, *straightforward*, and *unambiguous* information about a) what health harm is associated with exposures to lead in water of fetuses, infants, and small children, and b) the fact that, under the LCR, it is up to them to take appropriate precautions if they want to prevent exposures. In summary, the content of the messaging must be truthful and complete; not offer false assurances about the safety of the water when a PWS complies with the LCR; not make scientifically unsubstantiated statements downplaying the risks of lead in water relative to lead in paint, soil, and dust; and not mislead consumers into believing that there are simple answers when there aren't (e.g., that any one-time test below 15 ppb indicates that the water is safe to drink and cook with, or that a visual inspection of a service line inside a home showing "no lead" means that the entirety of the service line is lead-free). **In cases where a child is diagnosed with elevated BLLs, consumers also have a right to a comprehensive inspection of their service line material as well as comprehensive lead-in-water testing, whether or not the health department's environmental risk assessment identifies the presence in the child's environment of lead-containing paint, soil, or dust. Similarly, in cases where tap sampling at an individual home exceeds the proposed "household action level," consumers also have a right to a comprehensive assessment of the source/s of the lead.**

Finally, consumers have a right to access freely and easily *all* lead-related information pertaining to their jurisdiction, including *all* tap-sampling results with complete addresses and dates of collection,[18] sampling protocols, CCT, full disclosure of invalidated samples and reasons behind invalidations, as well as how a utility achieves compliance with the LCR, what LCR "compliance" actually means (and doesn't mean) for public health, what constitutes a proper lead-in-water sampling program, and what constitutes a proper lead-in-water sampling protocol. **We must remember that transparency is especially important under the LCR's "shared responsibility" regime. In fact, as cases like Washington, DC; Chicago, IL; Flint, MI; New Orleans, LA; and others have shown, it is the *only* mechanism by which the LCR can become a meaningful regulation.** This is because it offers the public a way to ensure, beyond the rudimentary checks by primacy agencies, that their PWS is carrying out properly its side of the rule's "shared responsibility" regime and providing the maximum public health protection it

[18] Rather than presuming that consumers who have their water sampled for lead want their results to remain private – a presumption that we know protects PWS cherry-picking of homes for LCR-compliance sampling – chain-of-custody forms must ask each and every resident to declare if they wish their results to remain private or if they grant the PWS permission to make them public. This question ought to include an explanation about the benefits of transparency for PWS accountability and public health protection, especially in the context of EPA's OECA principles for highly effective regulations. For residents who choose to have their results kept private, the LCR ought to require PWSs to release redacted home addresses plus a code that is unique to each home and makes possible comparisons between sampling pools from one sampling round to the next.

can. As the above cases illustrate, the public has repeatedly played the decisive role in discovering widespread lead-in-water problems in their jurisdictions, often long after contamination has begun. Free and easy access to information about lead holds promise for allowing consumers to become true and informed partners in the LCR, for PWSs to be trustworthy and accountable drinking water providers, and for public health to receive the proactive protection that the LCR intends.

III. IMPROVED CCT

CCT is "the most important element"[19] in the LCR's treatment technique, because it comprises the main method by which PWSs are required to achieve the rule's public-health-protective goal. The intent of the LCR's CCT requirement is CCT "optimization." This is defined as CCT that reduces lead-in-water levels at the tap to "***the lowest levels feasible***"[20] or that "***minimizes*** the lead and copper concentrations at users' taps while ensuring that the treatment does not cause the water system to violate any national primary drinking water regulation."[21] Under the LCR, optimized CCT is required as the first and primary line of defense against elevated levels of lead in consumer homes in:

- All small- and medium-size PWSs that exceed the LAL, and
- All large PWSs, whether they exceed the LAL or not.

The only conditions under which PWSs are *not* required to install optimized CCT are:

- In small- and medium-size PWSs, when they meet the LAL for two consecutive 6-month monitoring periods, and
- In all PWSs, when they can demonstrate that the difference between the '90th percentile lead-in-water level at consumer taps and the highest level of lead in their source water is less than or equal to 5 ppb for two consecutive 6-month monitoring periods.[22]

In other words, under the LCR, "optimized CCT" has two meanings. For small- and medium-size PWSs it refers to treatment that allows the PWS to meet the LAL. For large PWSs it refers to treatment that achieves the lowest possible levels of lead at consumer taps without violating any other national primary drinking water regulation. Because source water tends to be free of lead, most large PWSs can forgo CCT when their 90th percentile lead-in-water level is less

[19] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26479.
[20] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26477, emphasis added.
[21] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26462, emphasis added.
[22] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26480 and Federal Register, Vol. 65, No. 8 (2000), National Primary Drinking Water Regulations for Lead and Copper, p. 1960; The Federal Register of 1991 includes a third exception: when a PWS of any size can demonstrate "to the satisfaction of the State that the system has conducted activities equivalent to the corrosion control requirements needed to demonstrate that the system has installed optimal treatment." This exception was designed for PWSs that had installed optimized CCT prior to the LCR's promulgation. It is no longer applicable today.

than or equal to 5 ppb.[23]

Starting in 1993, all large PWSs were required to develop and implement a CCT program by taking the following seven steps: 1) Conducting initial lead-in-water and water quality parameter (WQP)[24] monitoring at consumer taps for two consecutive 6-month periods; 2) Conducting corrosion control studies; 3) Proposing to state primacy agencies optimal CCT and receiving approval for this treatment; 4) Installing optimal CCT; 5) Completing follow-up lead-in-water monitoring at consumer taps; 6) Proposing to state primacy agencies optimal WQPs and receiving approval for these parameters; and 7) Operating in compliance with optimal WQPs and continuing to conduct tap sampling.[25]

There are two reasons why this requirement is relevant today:

- **First, it illustrates the interdependent, always in dialogue, and always vulnerable-to-change relationship between optimal CCT and lead-in-water levels at the tap.** Under the LCR, lead-in-water levels in consumer homes must guide and inform determinations about what type of CCT can be deemed "optimized" in any given PWS. Optimized CCT, in turn, must achieve required lead-in-water level reductions at all times (i.e., below the LAL for small/medium PWSs and as low as feasible for large PWSs). Because the LCR's ultimate goal "is to provide maximum human health protection by reducing the lead and copper levels at consumers' taps to as close to the MCLG as is feasible,"[26] the rule requires routine tap monitoring even *after* optimized CCT is installed. This monitoring is intended to demonstrate the effectiveness of the treatment employed. It is also designed as an ongoing protective measure to ensure that any inadvertent rise in lead is promptly detected. This is because PWSs are dynamic, not static. Planned and unplanned changes to source water, treatment, plant operations, and the distribution system[27] may have impacts on lead levels at the tap that are not always predictable or may not always be sufficiently understood by PWSs. These changes can result in lead-in-water elevations even in PWSs whose optimized WQPs remain stable. **In other words, optimized CCT remains "optimized" as long as it continues to reduce effectively lead-in-water levels in consumer homes. By extension, CCT that is deemed "optimized" at one point in time cannot be assumed to continue to be "optimized" in the future *only* because the WQPs involved remain within established ranges.**[28]

[23] This is because the highest level of lead in source water is usually zero.
[24] These parameters were pH, alkalinity, calcium, conductivity, orthophosphate (if the corrosion inhibitor was phosphate-based), silica (if the corrosion inhibitor was silicate-based), and temperature.
[25] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26550.
[26] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26478.
[27] For example, increases with time in accumulation of lead scale in LSLs, increases in exposed iron in water mains that can impact lead release, or even something as simple as a storm that can increase or decrease chloride levels in the water, which can also impact lead release.
[28] The LCR of 1991 explains clearly the rationale and importance of assessing and adjusting CCT on the basis of direct feedback from lead-in-water levels at consumer taps: "Several commenters objected to using tap samples

This fact alone exposes perhaps the most significant weakness in the current LCR's compliance mechanism: that a PWS is deemed compliant with the rule if it manages to maintain its WQPs within the "optimized" ranges designated by the state. Conversely, a PWS is deemed in violation of the LCR if its WQPs fall outside these ranges. The problem with this mechanism is that it may have nothing to do with lead levels at consumer taps. In other words, it "punishes" PWSs for failure to maintain conditions that "control" the quality of the water in consumer homes only to a limited degree. Conversely, it "rewards" PWSs for success in maintaining the same conditions, even when lead-in-water contamination in their jurisdiction is widespread and maybe even worsening. Since 1991, for example, only 172 PWSs have failed to maintain optimized WQP ranges. But over 6,000 PWSs have exceeded the LAL and, therefore, have placed large numbers of consumers at significant public health risk.[29] The former group of PWSs violated the LCR. The latter group did not. One of the 6,000+ PWSs was the Washington, DC Water and Sewer Authority (DC WASA), which in 2001-2004 allowed elevated levels of lead in the water to go unchecked, in an event that is now acknowledged to have caused lead poisoning in hundreds (and perhaps thousands) of children.[30]

- The second reason the seven-step requirement is relevant today is that, according to EPA lead corrosion expert Mike Schock, **to date no large PWS has conducted step 2 as mandated by the Rule. That is, "by no legitimate scientific definition"[31] has any large PWS carried out corrosion control studies to identify CCT that results in the *lowest possible levels of lead at consumer taps* without violating any other national primary drinking**

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for measuring the effectiveness of corrosion control. These commenters were concerned that it would be difficult to ascertain whether a reduction in lead levels, measured at the tap after installing corrosion control, is a result of treatment or simply due to the aging of solder. They argued that water systems should be allowed alternative methods, such as the use of pilot plant studies or pipe loops to show the effectiveness of corrosion control. EPA agrees that water systems should use pipe loops, metal coupon, partial system tests, or other evaluative schemes to assist in determining the most effective corrosion control treatment. The Agency encourages water systems investigating different corrosion control treatments to first conduct research in the laboratory, whenever possible, before implementing system-wide corrosion control, and it anticipates that the majority of systems serving greater than 50,000 people will follow such procedures. **Although pipe loop and pilot plant studies can assist in planning a treatment strategy and predicting trends, they cannot be expected to predict the precise lead and copper levels at the tap** for numerous reasons including: (1) The aging effects of pipe scales, (2) the nature of preexisting pipe deposits not governed by lead or copper chemistry alone, (3) differences in surface chemistry between new and used pipes or faucets, and (4) disturbances of deposits when pipe from the field is pulled and used in the laboratory tests. Thus, **relying solely on laboratory studies to predict the effectiveness of corrosion control treatment would not indicate the levels of lead or copper at taps. Because of these problems and because EPA's goal is to reduce exposure to lead or copper in drinking water, it is essential to collect tap samples to determine if lead and copper levels at the tap decrease or increase after application of full-scale treatment and not to rely solely on laboratory studies to determine the effectiveness of treatment. Tap sampling after installation of corrosion control treatment is also necessary to evaluate whether lead service line replacement or additional public education is required**" (Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, pp. 26460-26564, emphasis added).

[29] See Miguel Del Toral's 2014 webinar presentation to the NDWAC LCR WG.

[30] Edwards, M., et al. 2009. Elevated Blood Lead in Young Children Due to Lead-contaminated Drinking Water: Washington, DC, 2001−2004. *Environmental Science and Technology* 43(5):1618−1623.

[31] Mike Schock, personal email communication, 6/25/15

water regulation. Instead, for almost two decades now, large PWSs and the primacy agencies overseeing them have deemed CCT "optimized" simply when 90th percentile values have met the LAL, regardless of the PWSs' ability to achieve further lead-in-water reductions. This constitutes a gross misinterpretation of the LCR, which from a public health perspective becomes even more troubling when one considers that a) the mandated 1st-draw sampling protocol does not capture worst-case lead in LSL homes, and b) many PWSs with and without LSLs use pre-flushing and thus likely underestimate their 90th percentile value.

Based on this background, it would seem that a meaningful improvement in the LCR's CCT requirement would at the very least a) ensure that all PWSs conduct proper lead-in-water monitoring targeting highest-risk homes, b) build conditions under which large PWSs are required to minimize lead-in-water levels to the lowest degree possible, c) mandate corrective actions when lead-in-water levels exceed the LAL (or "System Action Level"), and d) link to a compliance mechanism that corresponds to lead levels at the tap and increases public health protection.

The NDWAC LCR WG's recommendations for improved CCT do none of the above. Although they include several good ideas for more robust WQP monitoring (e.g., more frequent, more representative of the distribution system, in accordance with advancing science, with greater vigilance for unexpected WQP changes), they also:

- Lack any requirement that mandates the use of an ongoing feedback loop between WQPs and lead-in-water levels in consumer homes.

- Overlook the recent industry-funded study, which found that if the sampling protocol used for LCR compliance purposes were designed to capture worst-case lead from LSLs, approximately 70% of PWSs with LSLs would exceed the LAL. This means that CCT in these PWSs may be deemed "optimized" even when a true "worst-case" sampling would result in a LAL exceedance. When it comes to PWSs with LSLs, the WG's proposal that PWSs that can show three rounds of monitoring results meeting the LAL should be considered "optimized" under the revised rule seems unscientific and, from a public health perspective, indefensible. The same can be said for the proposal that three rounds of monitoring results that meet the LAL should continue to place PWSs on reduced lead-in-water monitoring.

- Overlook the fact that for PWSs that monitor in a manner that misses worst-case lead levels (i.e., through pre-flushing, aerator removal, and other means), 90th percentile lead-in-water values are likely underestimated. This means that CCT in these PWSs may be deemed "optimized" even when a true "worst-case" sampling would result in a LAL exceedance. When it comes to these PWSs, the WG's proposal that PWSs that can show three rounds of monitoring results meeting the LAL should be considered "optimized" under the revised rule seems unscientific and, from a public health perspective, indefensible. The same can be said for the proposal that three rounds of

monitoring results that meet the LAL should continue to place PWSs on reduced lead-in-water monitoring.

- Lack any trigger for a mandated comprehensive evaluation of *all* the factors that contributed to a LAL (or "System Action Level") exceedance and for mandated corrective actions following such an exceedance.

- Limit violations to PWS "failures" that often have no direct connection to actual lead-in-water problems in consumer homes or to locally-specific CCT interventions necessary to address such problems (i.e., the violations are, for all PWSs, *failure to notify/consult* with primacy agency about CCT reevaluation when the treatment or source water change; for large PWSs, *failure to review* CCT manuals issued by EPA; and for small/medium PWSs, *failure to assess CCT or make adjustments* when such actions are recommended by the state *on the basis EPA guidance manuals*).

I am concerned that a CCT requirement such as this will not only fail to fix known weaknesses in the LCR but will also officially release PWSs from regulatory responsibilities that are already mandated by the rule but are not enforced in practice (e.g., requiring worst-case lead-in-water sampling; requiring minimization of lead-in-water levels at consumer taps in large PWSs). Similarly, I am concerned that a CCT requirement such as this will stop short of mandating actions that current scientific understanding suggests are necessary (e.g., installation and maintenance of CCT that takes into account *all* the factors, and interactions between these factors, that in each PWS accelerate lead release).

There are probably many different schemes that can strengthen the LCR's CCT requirement. Any effective scheme must include at a minimum a) robust lead-in-water monitoring, b) lead release minimization in large PWSs, c) mandated implementation of appropriate corrective actions following a LAL (or "System Action Level") exceedance, and d) a regulatory compliance mechanism that links CCT to lead levels at the tap.

One example of such a scheme might be the following:

For all PWSs, mandated routine lead-in-water tap monitoring that targets highest-risk homes and uses an EPA-prescribed sampling protocol that is devoid of steps known to hide lead,[32] and that is coupled with comprehensive lead-in-water transparency requirements (see "public education" section above). For those PWSs that exceed the LAL (or "System Action Level"):

a. A comprehensive study of *all* the factors that contributed to the exceedance (not just the short list of WQPs in the current LCR)
b. Corrective actions from a toolbox of options that includes CCT "optimization"/"re-optimization," that PWSs navigate with guidance from EPA and primacy agencies, and that achieve the following goals:

[32] See EPA's current definition of a "proper" sample.

- For small/medium PWSs, a 90th percentile value below the LAL (or "System Action Level")
- For large PWSs, the lowest possible 90th percentile value without violating any other national primary drinking water regulation.

c. Once the proper goal is achieved, setting optimal WQP ranges for *all* relevant parameters, as appropriate for each specific system, which would then be monitored on a regular basis.
d. When a PWS notices "significant" changes, as defined by EPA, in either WQPs or 90th percentile values, requiring mandatory increased tap monitoring and initiating a "find and fix" approach that mandates making all necessary CCT adjustments or taking other appropriate actions.

A similar scheme could apply to PWS changes in treatment or source water. This type of requirement could be accompanied by a compliance mechanism that triggers violations when a PWS fails to carry out the above steps.

IV. MONITORING REQUIREMENTS

The Safe Drinking Water Act (SDWA) of 1974 was passed "to assure that the public is provided with safe drinking water."[33] The mechanism for achieving this goal is national primary drinking water regulations (NPDWRs) that set maximum contaminant levels (MCLs) or treatment techniques (TTs) for "contaminants which, in the judgment of the Administrator, may have any adverse effect on the health of persons."[34] NPDWRs incorporate criteria and procedures "to assure a supply of drinking water which dependably complies with"[34] the specific requirements set by each NPDWR.

The LCR is a TT NPDWR that requires PWSs to reduce consumers' exposure to lead in drinking water "to the lowest levels feasible."[20] The main vehicle through which the rule assures that this goal is achieved is "comprehensive tap sampling at homes specifically targeted for their potential to contain elevated levels of lead […]."[35] This type of sampling aims at confirming that in PWSs *without* CCT, CCT continues to not be needed, and in PWSs *with* CCT, the treatment used is "optimized" (see definitions of "optimal" CCT above).

In the final rule, EPA acknowledges the unique demands that tap sampling places on PWSs, and offers a lengthy rationale for the rigorous requirement. Emphasizing the variability of lead release from one home to another and one time to another, the agency explains why sampling that fails to target highest-risk homes and worst-case levels of lead in those homes, can miss extensive lead-in-water contamination and can result in PWS failure to comply with the requirements of both the LCR and the SDWA. In response to "numerous" commenters' objections to the highest-risk-home requirement, EPA provides the following response:

[33] Public Law 93-523, Dec. 16, 1974, p. 1660.
[34] Public Law 93-523, Dec. 16, 1974, p. 1661.
[35] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26514.

> "…the requirement to collect samples from locations that are most likely to have high concentrations of lead and copper in drinking water is reasonable and necessary given the nature of the problem of corrosion byproducts. Other contaminants regulated under the SDWA usually do not require monitoring at high-risk locations or at residential taps, since the occurrence of the contaminant will usually not change as it travels through the distribution system. In contrast, lead and copper levels in drinking water are not distributed uniformly. ***If random samples throughout the distribution systems were allowed to be collected, […] areas with serious lead and copper problems in household drinking water could be missed.*** EPA believes that these high-risk locations should be accounted for in a monitoring plan to better ensure that high levels of lead are detected and that the system institutes treatment that provides uniform and adequate levels of public health protection throughout the distribution system."[35]

Further emphasizing the necessity of knowing worst-case lead-in-water levels at consumer taps in order to be able to a) assess the need, adequacy, and effectiveness of CCT, and b) ensure that PWSs achieve the public health protective goals of the rule, EPA makes the case for a specific sampling protocol that captures "higher than average" lead release in a distribution system. It states:

> Moreover, the rule contains other procedures to ensure that excessive lead and/or copper levels would be detected in monitoring by requiring, for example, sampling of the first liter of water from the tap after water has been standing for at least 6 hours, conditions under which higher than average contaminant levels are likely to occur.[4] ***Targeting monitoring to worst-case conditions will help systems and States evaluate the reductions in contaminant levels achieved through treatment and determine when "optimal" treatment is being maintained to the degree most protective of public health. EPA believes that given the difficulties associated with accurately characterizing lead and copper levels at the tap, the final monitoring protocol will "assure a supply of drinking water which dependably complies with" the treatment components of this rule.***[35]

These excerpts illustrate how the LCR connects public health protection to worst-case tap monitoring, worst-case tap monitoring to CCT installation/optimization, and CCT installation/optimization back to public health protection. This triangle comprises the cornerstone of the LCR's TT and represents a PWS's most minimal and fundamental responsibility toward public health protection under the current regulation: ensuring that lead-in-water levels at the tap stay low through tap monitoring and CCT.[36] It is obvious, that strengthening the LCR's ability to protect public health necessitates, among other things, strengthening its tap-monitoring requirement to ensure that it yields scientifically reliable information about worst-case lead-in-water levels at highest-risk homes. This can, in turn, yield scientifically reliable information about the need or adequacy of CCT, which is crucial for effective public health protection.

The WG's recommendation for a new tap-monitoring requirement, however, takes the rule in the opposite direction by suggesting a regime

[36] Which is to be installed and maintained following a LAL exceedance in small/medium PWSs, and at all times in large PWSs.

that makes a reliable evaluation of CCT practically impossible.[37] The regime is built on volunteer customer-initiated tap sampling, includes all types of homes regardless of their risk in relation to lead in water, and allows each resident to select a sampling protocol from a menu of options.

Although customized tap sampling to identify individual problems in individual residences, such as reoccupied homes that have been unoccupied for extended periods of time, seems like a very good idea, it is defensible only as an *addition* to and not *replacement* of the current tap-monitoring requirement.[38] Replacing the current tap-monitoring requirement with the

[37] The recommendation is also based on three puzzling critiques of the current tap sampling requirement. Namely that:

1) PWSs have difficulty recruiting customers to take LCR-compliance samples. The implication is that customers are indifferent and a challenge for PWSs to engage. Indeed, in the absence of robust and consumer-centered public education with honest messaging about the health risks of lead in water, and in light of PWSs' regular assurances that the water they deliver meets federal safety requirements, it should be of little surprise that many residents decline participation in LCR-compliance sampling. But, as Flint, MI in the fall of 2015 demonstrated, when consumers are alerted to the possibility that a lead hazard may be present in their water, they themselves are likely to organize sampling events that can result in the collection of hundreds of samples in a short period of time. Washington, DC in the summer of 2003 demonstrated the same phenomenon, when residents established through neighborhood listservs initiatives for information sharing to try and establish the location of the contamination, which homes were getting tested, which homes were receiving their test results, what the results were, and if children drinking the water had been diagnosed with elevated BLLs. Washington, DC also demonstrated that when a PWS is motivated enough to collect lead-in-water tap samples, it can achieve extraordinary resident participation (6,118 samples from LSL homes alone during one single summer). For additional information, see "Lead testing results for water sampled by residents" and Nakamura, D. 2004. "Water in D.C. Exceeds EPA Lead Limit: Random Tests Last Summer Found High Levels in 4,000 Homes Throughout City." *Washington Post* (Jan. 31).

2) Customers implement sampling protocols inconsistently. To my knowledge, to date there is neither any study nor any recorded evidence demonstrating that customer sampling "inconsistencies" are a widespread problem or that they yield unreliable lead-in-water results. In fact, it is unclear to me what the "inconsistencies" about which the WG is concerned even are. The indisputable and troubling fact, however, is that *improper* sampling and reporting for LCR-compliance is occurring routinely and systematically and is, in all likelihood, resulting in underestimations of 90th percentile calculations, not due to consumer errors but due to PWS irregularities in the rule's implementation. See, for example, the Michigan Department of Environmental Quality's (MDEQ) lead-in-water sampling protocol, which includes a pre-flushing instruction, and which was adopted by the Flint, MI PWS, as well as the following *Washington Post* investigations: Leonnig, C. D. and D. Nakamura, 2004. "Several U.S. Utilities Being Investigated for Lead: Water Agencies Have Hidden or Misrepresented Test Results, Records Show," Leonnig, C. D. et al., 2004. "Lead Levels in Water Misrepresented Across U.S.: Utilities Manipulate or Withhold Test Results to Ward Off Regulators." PWS resistance to abandon pre-flushing and the NDWAC LCR WG's failure to recommend that pre-flushing be banned, make the WG's stated desire for "a more powerful check" on CCT not only unconvincing but also confusing. After all, the WG's own recommendation for a new tap monitoring requirement calls for the continuation of customer sampling and the use of different sampling protocols per household. This, if anything, would increase inconsistency of sampling, and perhaps even make consumer participation overwhelming and, ultimately, more difficult.

3) Sampling results vary based on the sampling protocol used and the configuration of a home's plumbing: Variation in lead-in-water levels within and between homes as well as in connection to different sampling protocols is a well-known fact about the nature of lead release that EPA acknowledged in the LCR of 1991 and discussed explicitly in the agency's justification for the rule's tap monitoring requirement (see example excerpt above). This is neither new information nor a challenge that signals the need for an entirely different tap sampling scheme.

[38] Moreover, sampling protocol/s would need to be determined with guidance from the PWS/EPA on a case-by-case basis (homes with LSLs, for example, would require different sampling methods than homes without LSLs; homes that used to have a LSL would require different sampling methods than homes that never had a LSL).

WG's recommended program would dismantle the LCR's 3-point cornerstone (i.e., public health protection - tap sampling in worst-case homes - CCT) and free PWSs from their primary responsibility to ensure that CCT is installed when needed, and always optimized when installed. Moreover, it could further mislead residents into believing that a one-time sample can provide meaningful insights into the safety of their water in the past, present, and future.

Contrary to the WG's claims, and as EPA explained in the final rule, random tap sampling can miss serious lead-in-water contamination. EPA didn't even consider the possibility of the use of multiple types of sampling protocols – a scheme that, by any scientific standard, would make it impossible to conduct a meaningful analysis of results, draw reliable conclusions about lead contamination problems system-wide, assess the effectiveness of CCT, and make informed decisions about needed interventions. Indeed, if the tap sampling recommended by the WG were used during the Washington, DC and Flint, MI lead-in-water crises, the high lead levels could easily have been missed as both cities have many homes with lead levels below 15 ppb.

Equally troubling is the WG's recommendation for regulatory compliance that centers on WQPs staying within their state-designated ranges, despite the well-known fact that a PWS's success on this front offers no assurance whatsoever that lead levels at consumer taps are as low as the LCR requires them to be. Simply put, current scientific understanding about lead corrosion and corrosion control provides no support for such a compliance scheme.

In summary, if adopted, the WG's tap-monitoring recommendations would result in sampling that can routinely miss large-scale lead-in-water contamination, just as we saw recently in Flint, MI; further jeopardize the public's health; and undermine the LCR as a NPDWR.

I propose that strengthening the LCR's tap monitoring requirement would necessitate at the very least:

- Ensuring that PWSs do indeed target highest-risk homes and can provide evidence that these homes meet the rule's highest-risk criteria.

- Mandating explicitly in rule language one sampling protocol for PWSs with no LSLs (i.e., based on a 1st-draw sample) and one sampling protocol for PWSs with LSLs (to be determined by EPA), and explicitly banning modifications (additions or deletions of any sort), including those known to artificially lower lead levels (e.g., pre-flushing, aerator removal). Mandating the collection of samples that reflect how water is normally used in homes (e.g., requiring large-mouthed sampling bottles, which better reflect how

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Leaving sampling protocol decisions such as these to residents seems highly problematic, if not outright inappropriate, because most residents do not have the training (and should not be expected to have the training) to assess what method of lead detection is most appropriate for their home's plumbing configuration and history.

water is drawn into cups and pots) and requiring samples to be collected with cold water tap fully open. PWSs with LSLs exceeding the LAL (or "System Action Level") should be required to take corrective steps and finally optimize CCT for LSLs (see Section III above).

- Mandating annual tap monitoring, unless and until a PWS establishes a documented history, as defined by EPA, of 90th percentile lead levels a) below the LAL (or "System Action Level") for small/medium PWS, and b) at the lowest concentration feasible for large PWSs, *through tap monitoring that targets highest-risk homes and uses a proper sampling protocol, targeting LSLs when present*.

- Banning sample invalidation after a sample is analyzed.[39]

- Requiring full transparency of all matters related to lead in water, including sampling pools, sampling protocols, documentation of LSL materials, lead-in-water monitoring results, and sample invalidations.

ACKNOWLEDGMENTS

I thank Paul Schwartz with the Water Alliance and Jennifer Chavez with Earthjustice for discussing with me and helping me process some of the complexities of the LCR. Marc Edwards at Virginia Tech has been instrumental in walking me through the science of lead corrosion and corrosion control. All opinions and any errors are my own.

[39] A 2004 EPA memo already prohibits this practice.

LINKS

Cover letter

1. Report of the Lead and Copper Rule Working Group To the National Drinking Water Advisory Council
   http://water.epa.gov/drink/ndwac/meetingsummaries/upload/ndwacmeetsummaug2015.pdf
2. Washington, DC
   http://www.washingtonpost.com/wp-dyn/content/article/2009/01/26/AR2009012602402.html?sid=ST2009012700722&s_pos=
3. Durham, NC
   http://www.salon.com/2006/11/27/lead_3/
4. Greenville, NC
   http://www.salon.com/2006/11/27/lead_3/
5. Providence, RI
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parents for nontoxic alternatives

October 28, 2015

To: The EPA National Drinking Water Advisory Council (NDWAC)
Re: Long-term revisions for the Lead and Copper Rule (LCR)

Dear Chair Jonas and members of the Council:

As a dissenting member of the Environmental Protection Agency (EPA) National Drinking Water Advisory Council (NDWAC) Lead and Copper Rule (LCR) working group, I herewith submit to NDWAC and to the official EPA record, my statement of dissent to the August 2015 "Report of the Lead and Copper Rule Working Group To the National Drinking Water Advisory Council."

I share fully the working group's commitment to a revised LCR that maximizes the protection of public health. I also commend the working group for its bold and innovative idea of building a brand new rule that is based on proactive, rather than reactive, full lead service line (LSL) replacement. As I mention in my statement, I see this as a step in the right direction. Unfortunately, however, my extensive experience with lead in drinking water in Washington, DC and nationally, has led me to believe that the working group's specific recommendations for how to implement a forward-thinking LCR would leave consumers less protected from exposures to lead in drinking water than would a revised version of the current rule that closes its well-known loopholes.

Mirroring the structure of the working group's report, I explain my reasoning in the pages that follow under these four sections:

I. Proactive Full LSL Replacement
II. Public Education for Lead and Lead Service Lines
III. Improved Corrosion Control Treatment
IV. Monitoring Requirements

I would also like to highlight the following three points, in case they prove useful to NDWAC's deliberations:

- It is sometimes assumed that a concerted effort to protect consumers from lead in drinking water is now necessary solely because science has shown that even small exposures to lead can cause significant health harm, and the Centers for Disease Control and Prevention (CDC) recently lowered its 10 micrograms per deciliter "blood lead level of concern" to a 5 micrograms per deciliter "reference level." Although these developments are true, they make for a very incomplete justification for the need to strengthen the LCR at this time. Since the LCR was promulgated, almost 25 years ago, we have gained a more complete scientific understanding of lead corrosion and corrosion control than we had in the early 1990s,

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including a far better understanding about the forms, sources, and prevalence of lead in drinking water; the multiplicity of factors that can worsen lead corrosion, including galvanic corrosion and physical disturbances of LSLs; the erratic, unpredictable, and difficult-to-detect release of lead particles; and the small- and large-scale public health harm that can result from inadequate or inappropriate applications of the current LCR. This information – coupled with insights from a) significant lead-in-water contamination events in cities like Washington, DC; Durham, NC; Greenville, NC; Providence, RI; and Flint, MI; and b) individual PWSs' questionable implementation of the LCR – has revealed that *lead in drinking water poses a serious, misunderstood, under-detected, and inadequately controlled health risk to consumers across the US. As such, revisions to address significant deficiencies and strengthen the rule are imperative.*

- Today we know that all US homes with lead-bearing plumbing materials face a risk of high lead in water, whether the PWS that serves them meets the LCR lead action level (LAL) or not. However, consumers in homes with LSLs (or homes that used to have LSLs) are *especially* vulnerable to long-term exposures, sometimes due to conditions that are extremely common and that are not controllable even with the best corrosion control treatment in place (e.g., physical disturbances of LSLs, prolonged periods of no water use resulting from lack of occupancy and followed by re-occupancy, or routine low water use). These conditions can cause disintegration of lead-bearing scales within pipes, which can in turn dislodge and pose an immediate and acute health risk to consumers analogous to lead paint exposure. It, therefore, seems advisable that NDWAC and EPA explore actions that can be taken by PWSs as soon as possible, and certainly before the final approval of the LCR long-term revisions, to alert the public to this exposure risk and offer guidance on appropriate health-protective measures.

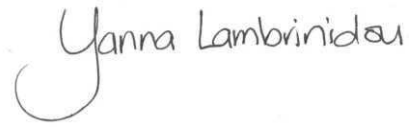
- There is no doubt that the LCR is a uniquely taxing rule for regulated PWSs and the public alike, as it places responsibility on both to minimize consumer exposures to lead at the tap. We also know that the points of contact between PWSs and consumers in relation to the LCR can at times be challenging. The WG's report to NDWAC alone, for example, makes reference to consumers who refuse to participate in LCR-compliance tap sampling, or sample their water improperly, or decline their PWS access to their property for full LSL replacement. As complex as these challenges – and others that I heard during the NDWAC LCR WG's deliberations – might be, I worry about the unexamined assumptions they can foster among PWSs, EPA, States, and even NGOs regarding who "consumers" are, what they understand, what they care about, and how they react. Specifically, I worry that these assumptions create room for unsubstantiated and obfuscating generalizations that overlook a) weaknesses in the LCR which leave consumers routinely uninformed and unprotected from preventable exposures to lead in water, b) PWS misinterpretations or misapplications of the rule that generate false assurances of safety and, when problems are uncovered, betray the public's trust, and c) extensively documented cases of consumers in jurisdictions that underwent significant lead-in-water contamination events, going to great lengths to understand the health risks of lead in water and the workings of the LCR, as well as to research, demand, and support scientifically-sound public-health-protective solutions (for more information see my dissenting statement).

> Because the LCR is a "shared responsibility" rule that presumes collaboration, coordination, and trust between PWSs and consumers, I believe it is extremely important that those of us who have the privilege to participate in policy-revisions deliberations stay alert to, and question, the climate of condescension and disrespect that can sometimes surface in connection to the very people that the LCR is intended to protect. I believe strongly that our ability to envision a closer and more transparent partnership between PWSs and the communities they serve will be necessary for developing revisions that make the LCR a better rule for all involved.

As I submit this statement of dissent, I declare that I have no conflicts of interest – financial, personal, or professional – and that all my work with, and for, the EPA NDWAC LCR WG was carried out as a volunteer.

Should you have any questions, please do not hesitate to contact me.

Sincerely,



Yanna Lambrinidou, PhD
President

STATEMENT OF DISSENT

from the Report of the Lead and Copper Rule Working Group
to the EPA National Drinking Water Advisory Council

I. PROACTIVE FULL LSL REPLACEMENT

Today we know that lead service lines (LSLs) and partially replaced LSLs pose a serious and permanent risk to human health, whether or not:

1. A public water system (PWS) meets the Lead and Copper Rule (LCR) lead action level (LAL), or
2. A one-time test of water sitting in a LSL (or a partially replaced LSL) reveals non-detect or low lead-in-water levels.

For this reason, the National Drinking Water Advisory Council (NDWAC) LCR working group's (WG's) recommendation for a mandated proactive full LSL replacement program is a step in the right direction. It also supports the WG's principle that under the revised LCR, resources and actions ought to maximize the protection of public health. Few would dispute that when it comes to lead in water, complete removal of LSLs would constitute one of the most public-health-protective actions possible. It would also result in significant long-term cost and environmental benefits since the amount of phosphate-based corrosion control required would be much lower on a permanent basis than if the LSLs remain in service. This conclusion seems more obvious and pressing today than at any other time, as current understanding about the risks of partial LSL replacement suggests strongly that the practice of removing only a portion of a LSL is not prudent from either a public health or financial standpoint.

However, the specifics of the WG's recommendation allow PWSs to delay full LSL replacement for decades, if not indefinitely, as well as to continue conducting partial LSL replacements, despite an extensive body of scientific research demonstrating that, under at least some circumstances, these replacements can pose a significant short- and long-term public health risk to consumers.[1]

For background, it is important to highlight that:

[1] Britton, A. and Richards, W.N., 1981. Factors Influencing Plumbosolvency in Scotland. *Journal of the Institute for Water Engineers and Scientists* 35(5):349-364; Cartier, C. et al. 2013. Impact of Treatment on Pb Release from Full and Partially Replaced Harvested Lead Service Lines (LSLs). *Water Research* 47(2):661-71; Cartier, C. et al. 2012. Effect of Flow Rate and Lead/Copper Pipe Sequence on Lead Release from Service Lines. *Water Research* 46(13):4142-52; St. Clair, J. et al. 2013. Long-term Behavior of Partially Replaced Lead Service Lines. Oral Presentation at CaNv-AWWA 2013 Inorganic Contaminants Symposium. Sacramento, CA; Hu, J. et al. 2012, Copper-Induced Metal Release from Lead Pipe into Drinking Water. *Corrosion* 68(11):1037-1048; Wang, Y. et al. 2013. Effect of Connection Methods on Lead Release from Galvanic Corrosion. *JAWWA* 105(7): E337-E351; Triantafyllidou, S. and M. Edwards 2011, Galvanic Corrosion after Simulated Small-Scale Partial Lead Service Line Replacements. *JAWWA* 103(9):85-99.

1. The LCR's lead-in-water monitoring requirement is intended to capture worst-case lead-in-water levels in highest-risk homes.[2]

2. The LCR's LSL replacement requirement is intended to function as a *remedial* measure that reduces or eliminates lead released from LSLs when corrosion control treatment (CCT) proves inadequate.

3. ***According to a recent industry-funded study, if the sampling protocol used for LCR compliance purposes were designed to capture worst-case lead from LSLs, it is estimated that approximately 70% of PWSs with LSLs would exceed the LAL.[3] This means that today, in the majority of PWSs with LSLs, LSL homes face a lead-in-water problem severe enough to, under the 25-year-old LCR LAL, trigger remedial requirements (i.e., source water monitoring, optimization or possible re-optimization of CCT, public education, LSL replacement). Such requirements are not triggered today only because the sampling protocol used for LCR compliance purposes is no longer fit for capturing worst-case lead levels in LSL homes.[4] Moreover, the pre-flushing employed by many PWSs is designed to actually miss worst-case LSL lead.***

If the current LCR were revised to reflect current scientific understanding about how to a) capture worst-case lead-in-water levels in LSL homes, and b) ensure that the LCR's LSL replacement requirement constitutes a remedy and not a heightened risk to human health:

- The sampling protocol for LCR compliance purposes would be revised to target, and capture health risks from, LSL water, and
- Partial LSL replacement would be banned for both LCR-mandated "involuntary" replacements and PWS-imposed "voluntary" replacements (see also the *American Academy of Pediatrics* and *Centers for Disease Control and Prevention* 2011 calls for a moratorium on this replacement).

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[2] The LCR states clearly that, "Targeting monitoring to worst-case conditions will help systems and States evaluate the reductions in contaminant levels achieved through treatment and determine when 'optimal' treatment is being maintained to the degree most protective of public health" (Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26514).

[3] Slabaugh, R. 2014. Optimized Corrosion Control—An Estimate of National Impact (Power Point presentation). AWWA Water Quality Technology Conference (WQTC), New Orleans, LA, Nov. 16-20.

[4] The sampling protocol used for LCR compliance purposes was designed to capture primarily interior sources of lead (i.e., lead-containing solder and lead-containing brass) as well as some LSL water. Today, however, interior sources of lead have diminished because they contain a relatively limited mass of lead, and because many premise plumbing components have been replaced with components that contain lower levels of lead, especially in the pre-1986 sampling pool of residences (see Triantafyllidou & Edwards 2012, Table 1 and discussion). On the other hand LSLs, which are 100% lead by weight, pose an *increased* risk to human health for many reasons (e.g., lead scale accumulates with time and can increasingly crack and flake with age, water conservation practices lengthen the contact time between water and LSLs, and the water in many PWSs is more corrosive due to higher chloride, the presence of chloramine, and the absence of chlorine) (see Marc Edwards' 2014 webinar talk to the NDWAC LCR WG). In other words, today LSLs pose a far greater risk to human health relative to any other lead-bearing plumbing material in a PWS's distribution system, and this disparity is likely to increase with time.

The NDWAC LCR WG's proactive LSL replacement recommendation includes neither of the above changes. Instead it proposes a dramatic departure from the LCR's current framework that:

- Ensures that PWSs with LSLs continue to conduct 90th percentile calculations based on tap samples that do not capture worst-case lead-in-water levels in LSL homes and, therefore, can continue to claim that they meet the LAL and can continue to not optimize (or re-optimize) their CCT, even when LSL homes dispense very high levels of lead and place consumers at significant health risk.

- Promotes the development of proactive full LSL replacement programs by all PWSs with LSLs that would trigger violations only when a PWS fails to conduct "meaningful" outreach to homeowners, and not when it fails to meet set goals of actually replacing LSLs.

- Is accompanied by a sorely anemic public education requirement (i.e., outreach to consumers in LSL homes "at least every three years" and when a new customer moves in), which ignores that today consumers in LSL homes are at daily risk of exposure to high levels of lead in their water and are, therefore, in need of *urgent* and *frequent* messaging about what they can do to protect themselves.

If implemented, this recommendation leaves room for long-term and indefinite delays of full LSL replacement. In fact, it makes such delays highly likely. Proactive full LSL replacement will be taxing for many PWSs in terms of needed time, resources, diverse and potentially escalating interventions, and coordination with multiple parties for years and decades to come, *even under the most favorable conditions* (i.e., with all the necessary funding, resources, and support in place). Adding to this burden PWS-specific limitations and obstacles that will most certainly arise in many, if not most, jurisdictions makes such a demanding initiative not "less" challenging than the LCR's current LSL replacement requirement, but challenging in a different way. For some PWSs the program might prove practically impossible, while for others it might take 2, and 5, and 8, if not more, decades to complete.

In fact, it may not be coincidental that the WG's recommendation to grant PWSs credit toward their full LSL replacement goals when they can demonstrate that a home with a presumed LSL does not actually have such a line, bears disturbing resemblance to the current LCR's "test-out" provision.[5] "Testing out" allows PWSs today to count a LSL that tests under the LAL in a one-time 1st-liter sample as "replaced" and to meet LCR LSL replacement requirements faster and with minimized expense while leaving the lead risk to many consumers unmitigated.

Significant and even indefinite delays under a regulatory scheme that does not render actual LSL replacement mandatory not only seem inevitable but would also risk:

[5] Nakamura, D. 2004.

1. **Not achieving the recommendation's intent of full LSL removal**
2. **Continuing to leave new generations of consumers in LSL homes inadequately protected from lead in water for years and decades to come, if not centuries, even while PWSs claim the water meets federal safety standards**
3. **Allowing PWSs with LSLs and suboptimal CCT to continue to use such CCT for years and decades to come, if not indefinitely.**

Comparing the WG's proactive full LSL replacement recommendation (which I will refer to as the "proposed LSL replacement program") with the current LSL replacement requirement, *if the latter were updated to reflect current scientific knowledge* (which I will refer to as the "existing LSL replacement program (without holes or loopholes)"),[6] it seems that the proposed LSL replacement program would provide stronger public health protection only under the following conditions:

- If the revised LCR mandated that PWSs *develop*, *obtain state approval for*, and *make transparent and easily accessible on the PWS's website* a full LSL replacement program, which would include:

  → Independently verified information about the PWS's legal authority to carry out replacement of plumbing materials (or hazardous plumbing materials) in private space (see original definition of "control" in LCR of 1991)
  → A prioritization scheme that targets for full LSL replacement neighborhoods with known or suspected LSLs, child care centers, areas with the highest blood lead levels (BLLs), and neighborhoods with homes that have been unoccupied for an extended period of time (the length of this period to be defined by EPA)
  → A financing scheme that makes private-side LSL replacement guaranteed for low-income customers.

  Such a requirement would help ensure that PWSs do indeed develop LSL replacement programs, that they use all available legal authority to carry out full LSL replacements, that they are accountable for following through with implementation, and that they implement these programs in such a way as to protect the most vulnerable populations first. Failure to achieve these objectives would trigger a violation or would return the PWS to the existing LSL replacement program (without holes or loopholes).

- If the revised LCR mandated frequent delivery of clear and urgent messaging to consumers in all homes presumed to have LSLs about the risk they face from exposure to high levels of lead in their water and steps they can take to prevent exposure.

[6] Such an update would include a compliance sampling protocol that captures LSL lead in LSL homes and a ban on partial LSL replacement.

- If the revised LCR included a *clear, concrete, and objectively measureable definition* of a PWS's "meaningful" effort to work with homeowners.[7] Such a definition would help prevent PWSs from unfairly blaming homeowners for refusing private side LSL replacement, when the circumstances are such that homeowners are not adequately informed about the risks of lead in water or the benefits of full LSL replacement, have no capacity to cover the cost of the replacement, or are under the false impression that their water is safe because a one-time test showed lead levels below 15 ppb. Only when there is quantifiable evidence that a PWS has made "meaningful" progress as measured by clear, concrete, and objectively measurable criteria, and this evidence is easily accessible to the public, should failure to comply with the new provisions not trigger a violation or not return the PWS to the existing LSL replacement program (without holes or loopholes).

- If the revised LCR granted PWSs credit toward their full LSL replacement goals *only* for every full LSL replacement they actually conducted, and not for demonstrating that a home with a presumed LSL did not in fact have such a line. This would help prevent a loophole similar to the current "test-out" provision whereby PWSs would be able to devote extensive amounts of time establishing the lack of LSLs in neighborhoods that they have good reason to believe have few, if any, such lines, while at the same time delaying the implementation of actual full LSL replacement in neighborhoods that they have good reason to believe have a high concentration of LSLs. A loophole such as this may also create a perverse incentive for PWSs to characterize as "lead-free" service lines with sections or components of unknown or ambiguous composition.

- If the revised LCR included clear criteria that PWSs would need to meet to declare a service line free of lead (i.e., free of any lead pipe portions as well lead pigtails, goosenecks, or other lead-bearing fittings), and required that records on each home were made publicly available on the PWS's website and contained information on:

    → All the materials present between the water main and the entry into the home (e.g., connectors between the water main and the service line, portion of service line up to the meter, portion of service line from the meter to the exterior wall of the residence, portion of service line from the exterior wall into the home, etc.)

    → The methods and dates by which these materials were confirmed.

[7] I recommend strongly that such a definition be developed with input from homeowners who have personal experience with the LCR's LSL replacement requirement. PWSs have a history of blaming homeowners for refusing private side LSL replacement, shifting claims of LSL "ownership" when it suits them, and not adequately informing consumers about the risks of lead in water or the benefits of full LSL replacement. They also have a history of making full LSL replacement inaccessible to low-income homeowners and failing to disabuse consumers from the false impression that their LSL poses no health risk because a one-time test showed lead levels below 15 ppb.

- If the revised LCR banned partial LSL replacement – a practice that can increase consumer risk of exposure to lead – and required PWSs that own or "control"[8] LSLs on private property to conduct and cover the cost of full LSL replacements during emergency repairs and water main work.

Short of the above conditions, the proposed LSL replacement program is likely to provide weaker public health protection than the existing LSL replacement program (without holes or loopholes), potentially causing significant health harm to many new generations of fetuses, infants, and young children and raising serious environmental justice questions and concerns.

II. PUBLIC EDUCATION FOR LEAD AND LSLS

In light of the fact that:

1. There is no safe level of lead in water
2. The LCR allows for:
    - 100% of homes sampled for LCR compliance to dispense any concentration of lead between 1-15 ppb
    - 10% of homes sampled for LCR compliance to dispense any concentration of lead whatsoever
3. The LCR allows PWSs exceeding the LAL to take up to 60 days to inform consumers about widespread contamination,

the LCR's compliance mechanism grants no individual consumer protection from chronic and acute exposures to lead in drinking water. In other words, under the LCR, consumers who want to be sure that the water they drink and cook with does not place them and their families at significant health risk from lead, are on their own to take precautionary measures. This means that public education about lead in water and the limitations of the LCR, including the limitations of CCT and one-time sampling, is vital for proper consumer action and, ultimately, for effective public health protection. Strong public outreach is urgent in all PWSs and even more so in PWSs with LSLs, most of which would exceed the LAL today if they sampled LSL water.

In light of the fact that today the vast majority of consumers are not aware that they are personally responsible for protecting themselves from lead in water, I concur with the NDWAC LCR WG's conclusion that a) a more robust public education requirement is needed, b) this requirement must be based on principles of consumer-centered risk communication, and c) to design this requirement, EPA ought to consult a diverse group of experts with strong representation from consumers who have been directly affected by lead in water and the LCR.

Since at the present time we do not know if EPA will convene such a group of experts, and since the NDWAC LCR WG's recommendation goes further to make concrete suggestions for a revised public education requirement, I consider it my

[8] Based on the LCR 1991 definition of this term, which does not necessitate that the PWS pay for the private side replacement of the LSL.

obligation to highlight what I perceive as a key deficiency in the WG's conceptualization of public education:

Today we know that all US homes with lead-bearing plumbing components face a risk of high lead in water, whether the PWS that serves them meets the LCR LAL or not. We must, after all, keep in mind that even with the most effective CCT possible and a successful proactive full LSL replacement program there are many *ordinary* conditions that can accelerate lead release (e.g., aging LSLs and lead-bearing solder, increase in water temperature, water conservation plumbing devices and practices, etc.). Consumers in homes with LSLs (or homes that used to have LSLs) are *especially* vulnerable to chronic and acute exposures to lead in water due to:

- Physical disturbances of LSLs (or pipes, such as galvanized iron, that have "absorbed" lead from such lines) caused by water- and non-water-related utility work.[9] In most jurisdictions such work takes place daily and can dislodge and release scale and sediment, which can contain excessively high levels of lead.

- Prolonged periods of no water use resulting from lack of occupancy. When unoccupied homes are subsequently re-occupied, they can pose an immediate and acute health risk to incoming residents due to the disintegration of lead-bearing scales and sediment in LSLs (or in pipes that have "absorbed" lead from such lines). The same type of disintegration can occur in homes with routine low water usage.[10]

For these reasons, effective public education ought to result in a change in consumers' *daily* water use practices that can minimize lead exposures at all times. This can be achieved through increased public understanding about the prevalence of lead in water, conditions that favor its release, the unpredictability of its release, health risks from ingestion, and steps to prevent exposure. **In other words, the LCR's public education requirement must aim at heightening consumer awareness about lead in water to the level that the current LCR tries to achieve following a LAL exceedance.[11]**

We must not forget that currently, comprehensive public education is mandated not because levels of lead in any individual home exceed zero ppb (the only concentration known to pose no risk to human health), but because over 10% of samples from targeted taps exceed the 25-year-old, non-public-health-protective LAL. This means that by the time comprehensive education is mandated, many consumers have been needlessly exposed to elevated levels of lead for prolonged

[9] Del Toral, M. A. et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *ES&T* 47(16): 9300–9307.
[10] Arnold, R., and M. Edwards. 2012. Electrochemical Reversal of Galvanic Pb:Cu Pipe Corrosion. *ES&T* 46(20):10941-7.
[11] Evidence suggests that the current LCR public education requirement for PWSs that exceed the LAL is not effective at changing consumer behavior. I mention it as an example of intent (i.e., to achieve long-term behavior change) rather than effectiveness (Griffin and Dunwoody 2000; Melissa Essex Elliot's 2014 webinar presentation to the NDWAC LCR WG).

periods of time. A further weakness (if not absurdity) in the rule's public education provision is that any given level of lead above the LAL in any given home may at one time fail to trigger the LCR's public education requirement and at another time succeed in doing so only because the contamination is found to be widespread. The inconsistency, therefore, between a) the only level of lead in water known to pose no risk to human health, b) actual levels of lead at consumer taps which often exceed zero ppb, and c) the LCR's "over 10%" prevalence criterion that triggers comprehensive public education only after harm has been done, highlights the need for ***a revised public education requirement that is proactively public-health-focused rather than reactively emergency-remediation-focused.***

To begin to visualize such a requirement, which similarly to public messaging about tobacco, alcohol, and drugs, would stress the increased vulnerability of fetuses, infants, and small children, it seems quite clear that we must first break out of outdated ways of thinking about public education. Consumer-centered risk communication best practices teach us two important lessons:

1. Information-heavy, long, non-personal, and non-actionable outreach messages delivered unidirectionally through a single channel of communication are ineffective.[12] Several studies have already documented the severe limitations of Consumer Confidence Reports (CCRs), while others have concluded that face-to-face communication as well as regular outreach and outreach through local grassroots organizations are far more successful at delivering desired messaging than written materials.[13,14]

2. For risk communication to achieve its intended goals, the public must be accepted and involved as a legitimate partner. According to the first of EPA's "Seven Cardinal Rules of Risk Communication," "First, people and communities have a right to participate in decisions that affect their lives, their property, and the things they value. Second, the goal of risk communication should not be to diffuse public concerns or avoid action. The goal should be to produce an informed public that is involved, interested, reasonable, thoughtful, solution-oriented, and collaborative."[15]

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[12] See Melissa Essex Elliot's 2014 webinar presentation to the NDWAC LCR WG.
[13] Griffin and Dunwoody 2000; Meyer-Emerick 2004; Morrone et al. 2005; AWWA 2005; Blette 2008; Roy et al. 2015; Summary of Interviews Conducted Regarding WASA's Public Education on Lead in Water.
[14] EPA's own guidelines for effective risk communication stress that messaging must explain clearly "the situation, the risks, and the remedies" ("Risk Communication in Action," pp. 12 and 17). The NDWAC LCR WG's proposed CCR language fails to tell readers what the likelihood of lead in their water is, or what they can do to protect fetuses, infants, and young children from exposure. At the same time, without information about *how* to determine if they have lead-bearing plumbing, the text advises consumers with such plumbing to have their water tested *if they wish*. This message fails to convey the simple fact that if lead-bearing plumbing exists a) consumers are at risk of exposure, b) a one-time test may be misleading, and c) precautions in homes with pregnant women, infants, and young children are extremely important at all times. Another prime example of PWS-centered public education is the CCR's lead-in-water table, which keeps consumers in the dark about the actual risks to their health, even when the LAL is met. Today, the vast majority of consumers do not know what the LCR monitoring requirement is or what "ppb," "MCLG," "LAL," and "90th percentile" mean. When consumers lack this information, they are unable to make sense of the data provided and assess a) the significance of 90th percentile values above or below the LAL, and b) what potential health risks from lead in water they might personally face.
[15] The EPA's Cardinal Rules of Risk Communication.

I am concerned that the specific suggestions in the NDWAC LCR WG's recommendation ignore these lessons, replicating the existing, ineffective scheme of public education that largely serves the interests of PWSs. Although such a scheme would allow PWSs to expediently "check the box" of regulatory compliance, it would also continue to leave consumers sub-optimally informed and ultimately unsupported in adopting new water-use practices for effective lead-exposure prevention. Specifically, all of the WG's recommendations involve unidirectional, written communications that are a) likely to be accessed only by consumers who are already sensitized to the problem of lead in water (e.g., National Clearinghouse), b) delivered as part of other, non-lead related informational packets and thus likely to receive diluted, if any, attention (e.g., CCR, letter to new customers), and c) delivered extremely infrequently (i.e., when a consumer becomes a new PWS customer, annually in the case of CCRs,[16] and approximately once every 3 years in the case of letters to residents in homes with LSLs). Additionally, the WG's recommendations include no call for mandatory outreach to caregivers and healthcare providers of vulnerable populations or low-income communities, and no partnerships between PWSs and consumers.

The compelling argument that the WG makes in support of a proactive full LSL replacement program – namely, that the LCR's LSL replacement requirement would be more effective if it were triggered under non-emergency conditions – is apt for public education as well. Proactive (and thus *non-crisis*) public education about lead in water that involves a) multiple channels of communication, b) regular frequency of messaging, and c) long-term partnerships with governmental, non-governmental, and local grassroots organizations devoted to children's health or to the welfare of low-income communities, with schools and daycare centers, as well as with community leaders and parent-to-be/parent groups, seems not only compliant with risk communication best practices but also imperative in the specific context of lead in drinking water and the LCR.[17] Such a requirement, which would intensify following a LAL (or "System Action Level") exceedance, could mandate that PWSs:

1. Develop, update, and post online a comprehensive database of local stakeholders
2. Create a taskforce that draws from this database and places heavy emphasis on broad representation from low-income neighborhoods, neighborhoods with a high concentration of LSLs, and parent-to-be/parent groups
3. In partnership with such a taskforce, develop a locally-appropriate, long-term, and multimedia public education program that meets well-defined EPA requirements

[16] In the case of the CCR, it must be noted that a) as more consumers sign up to have their water bills paid automatically and thus have less of an incentive to read regular mail from their water utility, and b) as more water utilities mail only a 1-page version of the CCR and leave it up to consumers to access the full version electronically, the number of consumers who will actually read the CCR is likely to drop further.

[17] The imperative of bidirectional communication in government messaging about environmental health is discussed extensively in the 2010 Education & Communication Working Group Report that was developed as part of the ATSDR/CDC "National Conversation" initiative. EPA's 1990 guidance for developing effective community-based public education programs is also still relevant and a very useful resource ("A Primer: Developing a Community-Based Public Education Program on Lead in Drinking Water").

4. Hold at least one annual meeting with all stakeholders, including any other interested members of the public and PWS staff, to go over such matters as the mechanics of lead in water, health risks of exposure, the LCR, key messaging for consumers, and the like, and generate new ideas for improved community outreach and involvement.

First and foremost, however, attention must be paid to the content of public education. Consumers have a right to *clear*, *straightforward*, and *unambiguous* information about a) what health harm is associated with exposures to lead in water of fetuses, infants, and small children, and b) the fact that, under the LCR, it is up to them to take appropriate precautions if they want to prevent exposures. In summary, the content of the messaging must be truthful and complete; not offer false assurances about the safety of the water when a PWS complies with the LCR; not make scientifically unsubstantiated statements downplaying the risks of lead in water relative to lead in paint, soil, and dust; and not mislead consumers into believing that there are simple answers when there aren't (e.g., that any one-time test below 15 ppb indicates that the water is safe to drink and cook with, or that a visual inspection of a service line inside a home showing "no lead" means that the entirety of the service line is lead-free). **In cases where a child is diagnosed with elevated BLLs, consumers also have a right to a comprehensive inspection of their service line material as well as comprehensive lead-in-water testing, whether or not the health department's environmental risk assessment identifies the presence in the child's environment of lead-containing paint, soil, or dust. Similarly, in cases where tap sampling at an individual home exceeds the proposed "household action level," consumers also have a right to a comprehensive assessment of the source/s of the lead.**

Finally, consumers have a right to access freely and easily *all* lead-related information pertaining to their jurisdiction, including *all* tap-sampling results with complete addresses and dates of collection,[18] sampling protocols, CCT, full disclosure of invalidated samples and reasons behind invalidations, as well as how a utility achieves compliance with the LCR, what LCR "compliance" actually means (and doesn't mean) for public health, what constitutes a proper lead-in-water sampling program, and what constitutes a proper lead-in-water sampling protocol. **We must remember that transparency is especially important under the LCR's "shared responsibility" regime. In fact, as cases like Washington, DC; Chicago, IL; Flint, MI; New Orleans, LA; and others have shown, it is the *only* mechanism by which the LCR can become a meaningful regulation.** This is because it offers the public a way to ensure, beyond the rudimentary checks by primacy agencies, that their PWS is carrying out properly its side of the rule's "shared responsibility" regime and providing the maximum public health protection it

[18] Rather than presuming that consumers who have their water sampled for lead want their results to remain private – a presumption that we know protects PWS cherry-picking of homes for LCR-compliance sampling – chain-of-custody forms must ask each and every resident to declare if they wish their results to remain private or if they grant the PWS permission to make them public. This question ought to include an explanation about the benefits of transparency for PWS accountability and public health protection, especially in the context of EPA's OECA principles for highly effective regulations. For residents who choose to have their results kept private, the LCR ought to require PWSs to release redacted home addresses plus a code that is unique to each home and makes possible comparisons between sampling pools from one sampling round to the next.

can. As the above cases illustrate, the public has repeatedly played the decisive role in discovering widespread lead-in-water problems in their jurisdictions, often long after contamination has begun. Free and easy access to information about lead holds promise for allowing consumers to become true and informed partners in the LCR, for PWSs to be trustworthy and accountable drinking water providers, and for public health to receive the proactive protection that the LCR intends.

III. IMPROVED CCT

CCT is "the most important element"[19] in the LCR's treatment technique, because it comprises the main method by which PWSs are required to achieve the rule's public-health-protective goal. The intent of the LCR's CCT requirement is CCT "optimization." This is defined as CCT that reduces lead-in-water levels at the tap to "***the lowest levels feasible***"[20] or that "***minimizes*** the lead and copper concentrations at users' taps while ensuring that the treatment does not cause the water system to violate any national primary drinking water regulation."[21] Under the LCR, optimized CCT is required as the first and primary line of defense against elevated levels of lead in consumer homes in:

- All small- and medium-size PWSs that exceed the LAL, and
- All large PWSs, whether they exceed the LAL or not.

The only conditions under which PWSs are *not* required to install optimized CCT are:

- In small- and medium-size PWSs, when they meet the LAL for two consecutive 6-month monitoring periods, and
- In all PWSs, when they can demonstrate that the difference between the '90th percentile lead-in-water level at consumer taps and the highest level of lead in their source water is less than or equal to 5 ppb for two consecutive 6-month monitoring periods.[22]

In other words, under the LCR, "optimized CCT" has two meanings. For small- and medium-size PWSs it refers to treatment that allows the PWS to meet the LAL. For large PWSs it refers to treatment that achieves the lowest possible levels of lead at consumer taps without violating any other national primary drinking water regulation. Because source water tends to be free of lead, most large PWSs can forgo CCT when their 90th percentile lead-in-water level is less

[19] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26479.
[20] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26477, emphasis added.
[21] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26462, emphasis added.
[22] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26480 and Federal Register, Vol. 65, No. 8 (2000), National Primary Drinking Water Regulations for Lead and Copper, p. 1960; The Federal Register of 1991 includes a third exception: when a PWS of any size can demonstrate "to the satisfaction of the State that the system has conducted activities equivalent to the corrosion control requirements needed to demonstrate that the system has installed optimal treatment." This exception was designed for PWSs that had installed optimized CCT prior to the LCR's promulgation. It is no longer applicable today.

than or equal to 5 ppb.[23]

Starting in 1993, all large PWSs were required to develop and implement a CCT program by taking the following seven steps: 1) Conducting initial lead-in-water and water quality parameter (WQP)[24] monitoring at consumer taps for two consecutive 6-month periods; 2) Conducting corrosion control studies; 3) Proposing to state primacy agencies optimal CCT and receiving approval for this treatment; 4) Installing optimal CCT; 5) Completing follow-up lead-in-water monitoring at consumer taps; 6) Proposing to state primacy agencies optimal WQPs and receiving approval for these parameters; and 7) Operating in compliance with optimal WQPs and continuing to conduct tap sampling.[25]

There are two reasons why this requirement is relevant today:

- **First, it illustrates the interdependent, always in dialogue, and always vulnerable-to-change relationship between optimal CCT and lead-in-water levels at the tap.** Under the LCR, lead-in-water levels in consumer homes must guide and inform determinations about what type of CCT can be deemed "optimized" in any given PWS. Optimized CCT, in turn, must achieve required lead-in-water level reductions at all times (i.e., below the LAL for small/medium PWSs and as low as feasible for large PWSs). Because the LCR's ultimate goal "is to provide maximum human health protection by reducing the lead and copper levels at consumers' taps to as close to the MCLG as is feasible,"[26] the rule requires routine tap monitoring even *after* optimized CCT is installed. This monitoring is intended to demonstrate the effectiveness of the treatment employed. It is also designed as an ongoing protective measure to ensure that any inadvertent rise in lead is promptly detected. This is because PWSs are dynamic, not static. Planned and unplanned changes to source water, treatment, plant operations, and the distribution system[27] may have impacts on lead levels at the tap that are not always predictable or may not always be sufficiently understood by PWSs. These changes can result in lead-in-water elevations even in PWSs whose optimized WQPs remain stable. **In other words, optimized CCT remains "optimized" as long as it continues to reduce effectively lead-in-water levels in consumer homes. By extension, CCT that is deemed "optimized" at one point in time cannot be assumed to continue to be "optimized" in the future *only* because the WQPs involved remain within established ranges.**[28]

[23] This is because the highest level of lead in source water is usually zero.
[24] These parameters were pH, alkalinity, calcium, conductivity, orthophosphate (if the corrosion inhibitor was phosphate-based), silica (if the corrosion inhibitor was silicate-based), and temperature.
[25] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26550.
[26] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26478.
[27] For example, increases with time in accumulation of lead scale in LSLs, increases in exposed iron in water mains that can impact lead release, or even something as simple as a storm that can increase or decrease chloride levels in the water, which can also impact lead release.
[28] The LCR of 1991 explains clearly the rationale and importance of assessing and adjusting CCT on the basis of direct feedback from lead-in-water levels at consumer taps: "Several commenters objected to using tap samples

This fact alone exposes perhaps the most significant weakness in the current LCR's compliance mechanism: that a PWS is deemed compliant with the rule if it manages to maintain its WQPs within the "optimized" ranges designated by the state. Conversely, a PWS is deemed in violation of the LCR if its WQPs fall outside these ranges. The problem with this mechanism is that it may have nothing to do with lead levels at consumer taps. In other words, it "punishes" PWSs for failure to maintain conditions that "control" the quality of the water in consumer homes only to a limited degree. Conversely, it "rewards" PWSs for success in maintaining the same conditions, even when lead-in-water contamination in their jurisdiction is widespread and maybe even worsening. Since 1991, for example, only 172 PWSs have failed to maintain optimized WQP ranges. But over 6,000 PWSs have exceeded the LAL and, therefore, have placed large numbers of consumers at significant public health risk.[29] The former group of PWSs violated the LCR. The latter group did not. One of the 6,000+ PWSs was the Washington, DC Water and Sewer Authority (DC WASA), which in 2001-2004 allowed elevated levels of lead in the water to go unchecked, in an event that is now acknowledged to have caused lead poisoning in hundreds (and perhaps thousands) of children.[30]

- The second reason the seven-step requirement is relevant today is that, according to EPA lead corrosion expert Mike Schock, **to date no large PWS has conducted step 2 as mandated by the Rule. That is, "by no legitimate scientific definition"[31] has any large PWS carried out corrosion control studies to identify CCT that results in the *lowest possible levels of lead at consumer taps* without violating any other national primary drinking**

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for measuring the effectiveness of corrosion control. These commenters were concerned that it would be difficult to ascertain whether a reduction in lead levels, measured at the tap after installing corrosion control, is a result of treatment or simply due to the aging of solder. They argued that water systems should be allowed alternative methods, such as the use of pilot plant studies or pipe loops to show the effectiveness of corrosion control. EPA agrees that water systems should use pipe loops, metal coupon, partial system tests, or other evaluative schemes to assist in determining the most effective corrosion control treatment. The Agency encourages water systems investigating different corrosion control treatments to first conduct research in the laboratory, whenever possible, before implementing system-wide corrosion control, and it anticipates that the majority of systems serving greater than 50,000 people will follow such procedures. **Although pipe loop and pilot plant studies can assist in planning a treatment strategy and predicting trends, they cannot be expected to predict the precise lead and copper levels at the tap** for numerous reasons including: (1) The aging effects of pipe scales, (2) the nature of preexisting pipe deposits not governed by lead or copper chemistry alone, (3) differences in surface chemistry between new and used pipes or faucets, and (4) disturbances of deposits when pipe from the field is pulled and used in the laboratory tests. Thus, **relying solely on laboratory studies to predict the effectiveness of corrosion control treatment would not indicate the levels of lead or copper at taps. Because of these problems and because EPA's goal is to reduce exposure to lead or copper in drinking water, it is essential to collect tap samples to determine if lead and copper levels at the tap decrease or increase after application of full-scale treatment and not to rely solely on laboratory studies to determine the effectiveness of treatment. Tap sampling after installation of corrosion control treatment is also necessary to evaluate whether lead service line replacement or additional public education is required**" (Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, pp. 26460-26564, emphasis added).

[29] See Miguel Del Toral's 2014 webinar presentation to the NDWAC LCR WG.

[30] Edwards, M., et al. 2009. Elevated Blood Lead in Young Children Due to Lead-contaminated Drinking Water: Washington, DC, 2001−2004. *Environmental Science and Technology* 43(5):1618−1623.

[31] Mike Schock, personal email communication, 6/25/15

water regulation. Instead, for almost two decades now, large PWSs and the primacy agencies overseeing them have deemed CCT "optimized" simply when 90th percentile values have met the LAL, regardless of the PWSs' ability to achieve further lead-in-water reductions. This constitutes a gross misinterpretation of the LCR, which from a public health perspective becomes even more troubling when one considers that a) the mandated 1st-draw sampling protocol does not capture worst-case lead in LSL homes, and b) many PWSs with and without LSLs use pre-flushing and thus likely underestimate their 90th percentile value.

Based on this background, it would seem that a meaningful improvement in the LCR's CCT requirement would at the very least a) ensure that all PWSs conduct proper lead-in-water monitoring targeting highest-risk homes, b) build conditions under which large PWSs are required to minimize lead-in-water levels to the lowest degree possible, c) mandate corrective actions when lead-in-water levels exceed the LAL (or "System Action Level"), and d) link to a compliance mechanism that corresponds to lead levels at the tap and increases public health protection.

The NDWAC LCR WG's recommendations for improved CCT do none of the above. Although they include several good ideas for more robust WQP monitoring (e.g., more frequent, more representative of the distribution system, in accordance with advancing science, with greater vigilance for unexpected WQP changes), they also:

- Lack any requirement that mandates the use of an ongoing feedback loop between WQPs and lead-in-water levels in consumer homes.

- Overlook the recent industry-funded study, which found that if the sampling protocol used for LCR compliance purposes were designed to capture worst-case lead from LSLs, approximately 70% of PWSs with LSLs would exceed the LAL. This means that CCT in these PWSs may be deemed "optimized" even when a true "worst-case" sampling would result in a LAL exceedance. When it comes to PWSs with LSLs, the WG's proposal that PWSs that can show three rounds of monitoring results meeting the LAL should be considered "optimized" under the revised rule seems unscientific and, from a public health perspective, indefensible. The same can be said for the proposal that three rounds of monitoring results that meet the LAL should continue to place PWSs on reduced lead-in-water monitoring.

- Overlook the fact that for PWSs that monitor in a manner that misses worst-case lead levels (i.e., through pre-flushing, aerator removal, and other means), 90th percentile lead-in-water values are likely underestimated. This means that CCT in these PWSs may be deemed "optimized" even when a true "worst-case" sampling would result in a LAL exceedance. When it comes to these PWSs, the WG's proposal that PWSs that can show three rounds of monitoring results meeting the LAL should be considered "optimized" under the revised rule seems unscientific and, from a public health perspective, indefensible. The same can be said for the proposal that three rounds of

monitoring results that meet the LAL should continue to place PWSs on reduced lead-in-water monitoring.

- Lack any trigger for a mandated comprehensive evaluation of *all* the factors that contributed to a LAL (or "System Action Level") exceedance and for mandated corrective actions following such an exceedance.

- Limit violations to PWS "failures" that often have no direct connection to actual lead-in-water problems in consumer homes or to locally-specific CCT interventions necessary to address such problems (i.e., the violations are, for all PWSs, *failure to notify/consult* with primacy agency about CCT reevaluation when the treatment or source water change; for large PWSs, *failure to review* CCT manuals issued by EPA; and for small/medium PWSs, *failure to assess CCT or make adjustments* when such actions are recommended by the state *on the basis EPA guidance manuals*).

I am concerned that a CCT requirement such as this will not only fail to fix known weaknesses in the LCR but will also officially release PWSs from regulatory responsibilities that are already mandated by the rule but are not enforced in practice (e.g., requiring worst-case lead-in-water sampling; requiring minimization of lead-in-water levels at consumer taps in large PWSs). Similarly, I am concerned that a CCT requirement such as this will stop short of mandating actions that current scientific understanding suggests are necessary (e.g., installation and maintenance of CCT that takes into account *all* the factors, and interactions between these factors, that in each PWS accelerate lead release).

There are probably many different schemes that can strengthen the LCR's CCT requirement. Any effective scheme must include at a minimum a) robust lead-in-water monitoring, b) lead release minimization in large PWSs, c) mandated implementation of appropriate corrective actions following a LAL (or "System Action Level") exceedance, and d) a regulatory compliance mechanism that links CCT to lead levels at the tap.

One example of such a scheme might be the following:

For all PWSs, mandated routine lead-in-water tap monitoring that targets highest-risk homes and uses an EPA-prescribed sampling protocol that is devoid of steps known to hide lead,[32] and that is coupled with comprehensive lead-in-water transparency requirements (see "public education" section above). For those PWSs that exceed the LAL (or "System Action Level"):

a. A comprehensive study of *all* the factors that contributed to the exceedance (not just the short list of WQPs in the current LCR)
b. Corrective actions from a toolbox of options that includes CCT "optimization"/"re-optimization," that PWSs navigate with guidance from EPA and primacy agencies, and that achieve the following goals:

[32] See EPA's current definition of a "proper" sample.

- For small/medium PWSs, a 90th percentile value below the LAL (or "System Action Level")
- For large PWSs, the lowest possible 90th percentile value without violating any other national primary drinking water regulation.

c. Once the proper goal is achieved, setting optimal WQP ranges for *all* relevant parameters, as appropriate for each specific system, which would then be monitored on a regular basis.
d. When a PWS notices "significant" changes, as defined by EPA, in either WQPs or 90th percentile values, requiring mandatory increased tap monitoring and initiating a "find and fix" approach that mandates making all necessary CCT adjustments or taking other appropriate actions.

A similar scheme could apply to PWS changes in treatment or source water. This type of requirement could be accompanied by a compliance mechanism that triggers violations when a PWS fails to carry out the above steps.

IV. MONITORING REQUIREMENTS

The Safe Drinking Water Act (SDWA) of 1974 was passed "to assure that the public is provided with safe drinking water."[33] The mechanism for achieving this goal is national primary drinking water regulations (NPDWRs) that set maximum contaminant levels (MCLs) or treatment techniques (TTs) for "contaminants which, in the judgment of the Administrator, may have any adverse effect on the health of persons."[34] NPDWRs incorporate criteria and procedures "to assure a supply of drinking water which dependably complies with"[34] the specific requirements set by each NPDWR.

The LCR is a TT NPDWR that requires PWSs to reduce consumers' exposure to lead in drinking water "to the lowest levels feasible."[20] The main vehicle through which the rule assures that this goal is achieved is "comprehensive tap sampling at homes specifically targeted for their potential to contain elevated levels of lead […]."[35] This type of sampling aims at confirming that in PWSs *without* CCT, CCT continues to not be needed, and in PWSs *with* CCT, the treatment used is "optimized" (see definitions of "optimal" CCT above).

In the final rule, EPA acknowledges the unique demands that tap sampling places on PWSs, and offers a lengthy rationale for the rigorous requirement. Emphasizing the variability of lead release from one home to another and one time to another, the agency explains why sampling that fails to target highest-risk homes and worst-case levels of lead in those homes, can miss extensive lead-in-water contamination and can result in PWS failure to comply with the requirements of both the LCR and the SDWA. In response to "numerous" commenters' objections to the highest-risk-home requirement, EPA provides the following response:

[33] Public Law 93-523, Dec. 16, 1974, p. 1660.
[34] Public Law 93-523, Dec. 16, 1974, p. 1661.
[35] Federal Register, Vol. 56, No. 110 (1991), Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper, p. 26514.

> "…the requirement to collect samples from locations that are most likely to have high concentrations of lead and copper in drinking water is reasonable and necessary given the nature of the problem of corrosion byproducts. Other contaminants regulated under the SDWA usually do not require monitoring at high-risk locations or at residential taps, since the occurrence of the contaminant will usually not change as it travels through the distribution system. In contrast, lead and copper levels in drinking water are not distributed uniformly. ***If random samples throughout the distribution systems were allowed to be collected, […] areas with serious lead and copper problems in household drinking water could be missed.*** EPA believes that these high-risk locations should be accounted for in a monitoring plan to better ensure that high levels of lead are detected and that the system institutes treatment that provides uniform and adequate levels of public health protection throughout the distribution system."[35]

Further emphasizing the necessity of knowing worst-case lead-in-water levels at consumer taps in order to be able to a) assess the need, adequacy, and effectiveness of CCT, and b) ensure that PWSs achieve the public health protective goals of the rule, EPA makes the case for a specific sampling protocol that captures "higher than average" lead release in a distribution system. It states:

> Moreover, the rule contains other procedures to ensure that excessive lead and/or copper levels would be detected in monitoring by requiring, for example, sampling of the first liter of water from the tap after water has been standing for at least 6 hours, conditions under which higher than average contaminant levels are likely to occur.[4] ***Targeting monitoring to worst-case conditions will help systems and States evaluate the reductions in contaminant levels achieved through treatment and determine when "optimal" treatment is being maintained to the degree most protective of public health. EPA believes that given the difficulties associated with accurately characterizing lead and copper levels at the tap, the final monitoring protocol will "assure a supply of drinking water which dependably complies with" the treatment components of this rule.***[35]

These excerpts illustrate how the LCR connects public health protection to worst-case tap monitoring, worst-case tap monitoring to CCT installation/optimization, and CCT installation/optimization back to public health protection. This triangle comprises the cornerstone of the LCR's TT and represents a PWS's most minimal and fundamental responsibility toward public health protection under the current regulation: ensuring that lead-in-water levels at the tap stay low through tap monitoring and CCT.[36] It is obvious, that strengthening the LCR's ability to protect public health necessitates, among other things, strengthening its tap-monitoring requirement to ensure that it yields scientifically reliable information about worst-case lead-in-water levels at highest-risk homes. This can, in turn, yield scientifically reliable information about the need or adequacy of CCT, which is crucial for effective public health protection.

The WG's recommendation for a new tap-monitoring requirement, however, takes the rule in the opposite direction by suggesting a regime

[36] Which is to be installed and maintained following a LAL exceedance in small/medium PWSs, and at all times in large PWSs.

that makes a reliable evaluation of CCT practically impossible.[37] The regime is built on volunteer customer-initiated tap sampling, includes all types of homes regardless of their risk in relation to lead in water, and allows each resident to select a sampling protocol from a menu of options.

Although customized tap sampling to identify individual problems in individual residences, such as reoccupied homes that have been unoccupied for extended periods of time, seems like a very good idea, it is defensible only as an *addition* to and not *replacement* of the current tap-monitoring requirement.[38] Replacing the current tap-monitoring requirement with the

[37] The recommendation is also based on three puzzling critiques of the current tap sampling requirement. Namely that:

1) PWSs have difficulty recruiting customers to take LCR-compliance samples. The implication is that customers are indifferent and a challenge for PWSs to engage. Indeed, in the absence of robust and consumer-centered public education with honest messaging about the health risks of lead in water, and in light of PWSs' regular assurances that the water they deliver meets federal safety requirements, it should be of little surprise that many residents decline participation in LCR-compliance sampling. But, as Flint, MI in the fall of 2015 demonstrated, when consumers are alerted to the possibility that a lead hazard may be present in their water, they themselves are likely to organize sampling events that can result in the collection of hundreds of samples in a short period of time. Washington, DC in the summer of 2003 demonstrated the same phenomenon, when residents established through neighborhood listservs initiatives for information sharing to try and establish the location of the contamination, which homes were getting tested, which homes were receiving their test results, what the results were, and if children drinking the water had been diagnosed with elevated BLLs. Washington, DC also demonstrated that when a PWS is motivated enough to collect lead-in-water tap samples, it can achieve extraordinary resident participation (6,118 samples from LSL homes alone during one single summer). For additional information, see "Lead testing results for water sampled by residents" and Nakamura, D. 2004. "Water in D.C. Exceeds EPA Lead Limit: Random Tests Last Summer Found High Levels in 4,000 Homes Throughout City." *Washington Post* (Jan. 31).

2) Customers implement sampling protocols inconsistently. To my knowledge, to date there is neither any study nor any recorded evidence demonstrating that customer sampling "inconsistencies" are a widespread problem or that they yield unreliable lead-in-water results. In fact, it is unclear to me what the "inconsistencies" about which the WG is concerned even are. The indisputable and troubling fact, however, is that *improper* sampling and reporting for LCR-compliance is occurring routinely and systematically and is, in all likelihood, resulting in underestimations of 90th percentile calculations, not due to consumer errors but due to PWS irregularities in the rule's implementation. See, for example, the Michigan Department of Environmental Quality's (MDEQ) lead-in-water sampling protocol, which includes a pre-flushing instruction, and which was adopted by the Flint, MI PWS, as well as the following *Washington Post* investigations: Leonnig, C. D. and D. Nakamura, 2004. "Several U.S. Utilities Being Investigated for Lead: Water Agencies Have Hidden or Misrepresented Test Results, Records Show," Leonnig, C. D. et al., 2004. "Lead Levels in Water Misrepresented Across U.S.: Utilities Manipulate or Withhold Test Results to Ward Off Regulators." PWS resistance to abandon pre-flushing and the NDWAC LCR WG's failure to recommend that pre-flushing be banned, make the WG's stated desire for "a more powerful check" on CCT not only unconvincing but also confusing. After all, the WG's own recommendation for a new tap monitoring requirement calls for the continuation of customer sampling and the use of different sampling protocols per household. This, if anything, would increase inconsistency of sampling, and perhaps even make consumer participation overwhelming and, ultimately, more difficult.

3) Sampling results vary based on the sampling protocol used and the configuration of a home's plumbing: Variation in lead-in-water levels within and between homes as well as in connection to different sampling protocols is a well-known fact about the nature of lead release that EPA acknowledged in the LCR of 1991 and discussed explicitly in the agency's justification for the rule's tap monitoring requirement (see example excerpt above). This is neither new information nor a challenge that signals the need for an entirely different tap sampling scheme.

[38] Moreover, sampling protocol/s would need to be determined with guidance from the PWS/EPA on a case-by-case basis (homes with LSLs, for example, would require different sampling methods than homes without LSLs; homes that used to have a LSL would require different sampling methods than homes that never had a LSL).

WG's recommended program would dismantle the LCR's 3-point cornerstone (i.e., public health protection - tap sampling in worst-case homes - CCT) and free PWSs from their primary responsibility to ensure that CCT is installed when needed, and always optimized when installed. Moreover, it could further mislead residents into believing that a one-time sample can provide meaningful insights into the safety of their water in the past, present, and future.

Contrary to the WG's claims, and as EPA explained in the final rule, random tap sampling can miss serious lead-in-water contamination. EPA didn't even consider the possibility of the use of multiple types of sampling protocols – a scheme that, by any scientific standard, would make it impossible to conduct a meaningful analysis of results, draw reliable conclusions about lead contamination problems system-wide, assess the effectiveness of CCT, and make informed decisions about needed interventions. Indeed, if the tap sampling recommended by the WG were used during the Washington, DC and Flint, MI lead-in-water crises, the high lead levels could easily have been missed as both cities have many homes with lead levels below 15 ppb.

Equally troubling is the WG's recommendation for regulatory compliance that centers on WQPs staying within their state-designated ranges, despite the well-known fact that a PWS's success on this front offers no assurance whatsoever that lead levels at consumer taps are as low as the LCR requires them to be. Simply put, current scientific understanding about lead corrosion and corrosion control provides no support for such a compliance scheme.

In summary, if adopted, the WG's tap-monitoring recommendations would result in sampling that can routinely miss large-scale lead-in-water contamination, just as we saw recently in Flint, MI; further jeopardize the public's health; and undermine the LCR as a NPDWR.

I propose that strengthening the LCR's tap monitoring requirement would necessitate at the very least:

- Ensuring that PWSs do indeed target highest-risk homes and can provide evidence that these homes meet the rule's highest-risk criteria.

- Mandating explicitly in rule language one sampling protocol for PWSs with no LSLs (i.e., based on a 1st-draw sample) and one sampling protocol for PWSs with LSLs (to be determined by EPA), and explicitly banning modifications (additions or deletions of any sort), including those known to artificially lower lead levels (e.g., pre-flushing, aerator removal). Mandating the collection of samples that reflect how water is normally used in homes (e.g., requiring large-mouthed sampling bottles, which better reflect how

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Leaving sampling protocol decisions such as these to residents seems highly problematic, if not outright inappropriate, because most residents do not have the training (and should not be expected to have the training) to assess what method of lead detection is most appropriate for their home's plumbing configuration and history.

water is drawn into cups and pots) and requiring samples to be collected with cold water tap fully open. PWSs with LSLs exceeding the LAL (or "System Action Level") should be required to take corrective steps and finally optimize CCT for LSLs (see Section III above).

- Mandating annual tap monitoring, unless and until a PWS establishes a documented history, as defined by EPA, of 90th percentile lead levels a) below the LAL (or "System Action Level") for small/medium PWS, and b) at the lowest concentration feasible for large PWSs, *through tap monitoring that targets highest-risk homes and uses a proper sampling protocol, targeting LSLs when present*.

- Banning sample invalidation after a sample is analyzed.[39]

- Requiring full transparency of all matters related to lead in water, including sampling pools, sampling protocols, documentation of LSL materials, lead-in-water monitoring results, and sample invalidations.

ACKNOWLEDGMENTS

I thank Paul Schwartz with the Water Alliance and Jennifer Chavez with Earthjustice for discussing with me and helping me process some of the complexities of the LCR. Marc Edwards at Virginia Tech has been instrumental in walking me through the science of lead corrosion and corrosion control. All opinions and any errors are my own.

[39] A 2004 EPA memo already prohibits this practice.

LINKS

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